Practitioner's Docket No. D-1056 DIV 3 **PATENT**

01/27/98 U.S. PTO

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

Anticipated Classification of this application:

Class _____ Subclass _____

Prior application:

Examiner: PAUL P. GORDON

Art Unit: 2786

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

TRANSMITTAL OF FILING UNDER 37 C.F.R. 1.53(b)

WARNING: *A C-I-P (continuatidn-in-part) **cannot** be filed under 37 CFR 1.60(b).*

WARNING: *A filing under 37 C.F.R. § 1.60(b) can only be made if the "prior application was a nonprovisional application and a complete application as set forth in § 1.51(a)(1)." 37 C.F.R. § 1.60(b)(1).*

WARNING: *Filing under 37 CFR 1.60 is permitted only if filed by the same or less than all the inventors named in the prior application. 37 CFR 1.60(b)(3).*

WARNING: *The filing of an application at the United States stage of an International Application requires an oath or declaration. 37 CFR 1.61(a)(4).*

WARNING: *The claims of this new application may be finally rejected in the first Office action where all claims of the new application are drawn to the same invention claimed in the earlier application and would have been properly finally rejected on the grounds or art of record in the next Office action if they had been entered in the earlier application. MPEP § 706.07(b).*

This is a request for filing a

☐ Continuation

☒ Divisional

application under 37 CFR 1.53(b), of pending prior application

Serial No. 08/ 361,783 filed on DECEMBER 16, 1994
Date

CERTIFICATION UNDER 37 C.F.R. 1.10*
(Express Mail label number is mandatory.)
(Express Mail certification is optional.)

I hereby certify that this 37 CFR 1.60 request and the documents referred to as attached therein are being deposited with the United States Postal Service on this date JANUARY 27, 1998, in an envelope as "Express Mail Post Office to Addressee," mailing Label Number EM104212428US, addressed to the: Assistant Commissioner for Patents, Washington, D.C. 20231.

RALPH E. JOCKE
(type or print name of person mailing paper)

Signature of person mailing paper

WARNING: *Certificate of mailing (first class) or facsimile transmission procedures of 37 C.F.R. 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.*

***WARNING:** *Each paper or fee filed by "Express Mail" **must** have the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 C.F.R. 1.10(b).*
*"Since the filing of correspondence under § 1.10 without the Express Mail mailing label thereon is an oversight that can be avoided by the exercise of reasonable care, requests for waiver of this requirement will **not** be granted on petition." Notice of Oct. 24, 1996, 60 Fed. Reg. 56,439, at 56,442.*

of R. MICHAEL MCGRADY, MAX A. FEDOR, ERIC R. COLBURN, DANIEL W. NEU, ROBERT G. GILLIO
Inventor(s)

for INVENTORY MONITORING AND DISPENSING SYSTEM FOR MEDICAL ITEMS
Title of invention

NOTE: 37 CFR 1.60 permits the omission of a declaration only if the prior application was complete as set forth in 37 CFR 1.51(a), namely, the prior application comprised at least (1) a specification, including a claim or claims; (2) a declaration; (3) drawings when necessary; and (4) the prescribed filing fee. Accordingly, as presently worded, 37 CFR 1.60 does not permit this procedure to be used where the prior application is pending but only the processing and retention fee required by 37 CFR 1.21(l) is paid or where the declaration was not filed.

1. Copy of Prior Application as Filed That is Attached

NOTE: Under 37 CFR 1.60, practice signing and execution of the application by the applicant may be omitted provided the copy is supplied by and accompanied by a statement by the applicant or his or her attorney or agent that the application papers comprise a true copy of the prior application as filed and that no amendments referred to in the declaration filed to complete the prior application introduced new matter therein.

NOTE: This statement need not be verified if made by an attorney registered to practice before the PTO. (37 CFR 1.60(b)).

☒ I hereby verify that the attached papers are a true copy of what is shown in my records to be the above identified prior application, including the oath or declaration originally filed. (37 C.F.R. 1.60(b)(2))

The copy of the papers of prior application as filed which are attached are as follows:

☒ 47 page(s) of specification

☒ 13 page(s) of claims

☒ 1 page(s) of abstract

☒ 20 sheet(s) of drawing

(also complete part 6 below, if drawings are to be transferred)

☒ 7 pages of declaration and power of attorney

(If the copy of the declaration being filed does not show applicant's signature, because the attorney's records do not contain a copy of the signed declaration actually filed for the application, indicate thereon that it was signed and complete the following:)

☐ In accordance with the indication required by 37 C.F.R. 60(b), my records reflect that the original signed declaration showing applicant's signature was filed on _____.

☐ The amendment referred to in the declaration filed to complete the prior application and I hereby state, in accordance with the requirements of 37 CFR 1.60(b), that this amendment did not introduce new matter therein.

2. Amendments

WARNING: *"The claim of a new application may be finally rejected in the first Office action in those situations where (1) the new application is a continuing application of, or a substitute for, an earlier application, and (2) all the claims of the new application (a) are drawn to the same invention claimed in the earlier application, and (b) would have been properly finally rejected on the grounds or art of record in the next Office action if they had been entered in the earlier application." MPEP § 706.07(b).*

☒ Cancel in this application original claims 2-37 of the prior application before calculating the filing fee. (At least one original independent claim must be retained for filing purposes.)

☒ A preliminary amendment is enclosed. (Claims added by this amendment have been properly numbered consecutively beginning with the number next following the highest numbered original claim in the prior application.)

NOTE: Only amendments reducing the number of claims or adding a reference to the prior application (§ 1.78(a)) will be entered before calculating the filing fee and granting the filing date. 37 CFR 1.60(b)(4).

NOTE: "When filing under Rule 1.60 retain at least one original claim from the patent application to assure a complete application." Notice of March 3, 1986 (1064 O.G. 37-38).

3. Petition for Suspension of Prosecution for the Time Necessary to File an Amendment

NOTE: Where it is possible that the claims on file will give rise to a first action final for this continuation application and for some reason an amendment cannot be filed promptly (e.g., experimental data is being gathered) it may be desirable to file a petition for suspension of prosecution for the time necessary).

(check the next item, if applicable)

☐ There is provided herewith a Petition To Suspend Prosecution For The Time Necessary to File An Amendment (New Application Filed Concurrently).

4. Information Disclosure Statement

(check this item, if applicable)

☐ An information disclosure statement is submitted herewith.

5. Fee Calculation (37 CFR 1.16)

A. Utility (37 C.F.R. 1.16(a), (b), (c), and (d))

CLAIMS AS FILED					
Number filed	Number Extra		Rate	Basic Fee 37 CFR 1.16(a) $790.00	
Total Claims (37 CFR 1.16(c))	1	−20= 0	×	$ 22.00	0
Independent Claims (37 CFR 1.16(b))	1	−3= 0	×	$ 82.00	0
Multiple dependent claim(s), if any (37 CFR 1.16(d))			+	$270.00	0

☐ Fee for extra claims is not being paid at this time. (37 C.F.R 1.16(d))

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency. 37 CFR 1.16(d).

Filing Fee Calculation $ 790

B. Design (37 C.F.R. 1.16(f))
Filing fee calculation. . . . . $ 330.00

6. Small Entity Status

☐ A verified statement that this filing is by a small entity:

☐ is attached.

☐ has been filed in the parent application and such status is still proper and desired. (37 CFR 1.28(a))

Filing Fee Calculation (50% of above) $_____

NOTE: Any excess of the full fee paid will be refunded if a verified statement is filed within 2 months of the date of timely payment of a full fee then the excess fee paid will be refunded on request. 37 CFR 1.28(a).

NOTE: See 37 CFR 1.28(a).

7. Drawings

☒ Drawings are enclosed

☐ Formal

☒ Informal

WARNING: *DO NOT submit original drawings. A high quality copy of drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards of § 1.84. If corrections to the drawings are necessary, they should be made to the original drawings and a high-quality copy of the corrected original drawing then submitted to the Office. Only one copy is required or desired. Comments on proposed new 37 CFR 1.84. Notice of March 9, 1988 (1090 O.G. 57-62).*

NOTE: "Identifying indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawings a minimum distance of 1.5 cm. (⅝ inch) down from the top of the page." 37 C.F.R. 1.84(c)).

8. Priority—35 U.S.C. 119

☐ Priority of application Serial No. 0 /_____ filed on _____ in _____ is claimed under 35 U.S.C. 119. (Country)

☐ The certified copy has been filed in prior U.S. application Serial No. 0 /_____ on _____.

☐ The certified copy will follow.

9. Relate Back—35 U.S.C. 120

☒ Amend the specification by inserting, before the first line, the following sentence:

"This is a

☐ continuation

☒ divisional

of copending application(s)

☒ Serial number 0 8/ 361,783 filed on DECEMBER 16, 1994 "

☐ International Application _____ filed on _____ that designated the U.S."

NOTE: The proper reference to a prior filed PCT application that entered the U.S. national phase is the U.S. serial number and the filing date of the PCT application which designated the U.S.

10. Inventorship Statement

NOTE: "If the continuation or divisional application is filed by less than all the inventors named in the prior application, a statement must accompany the application when filed requesting deletion of the names of the person or persons who are not inventors of the invention being claimed in the continuation or divisional application." 37 CFR 1.60(b)(4) [emphasis added].

(complete appropriate items (a) and (b))

(a) With respect to the prior copending U.S. application from which this application claims benefit under 35 U.S.C. 120, the inventor(s) in this application is (are):

(complete applicable item below)

☒ the same.

☐ less than those named in the prior application. It is requested that the following inventor(s) identified above for the prior application be deleted:

_____

(type name(s) of inventor(s) to be deleted)

(b) The inventorship for all the claims in this application are

☒ the same.

☐ not the same. And an explanation, including the ownership of the various claims at the time the last claimed invention was made, is submitted.

11. Assignment

ASSIGNMENT DOCUMENTS RECORDED AT REEL/FRAME 7295/0097; 8354/0631

☒ The prior application is assigned of record to DIEBOLD, INCORPORATED.

☐ An assignment of the invention to _____

_____

is attached. A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☐ FORM PTO 1595 is also attached.

NOTE: "If an assignment is submitted with a new application, send two separate letters - one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

NOTE: When an assignee files a . . . divisional application (under . . . 1.60 . . .) reference may be made to a statement filed under 37 CFR 3.73(b) in the parent application, or a copy of that statement may be filed. Notice of April 30, 1993, 1150 O.G. 62-64.

12. Fee Payment Being Made At This Time

☐ Not Enclosed

☐ No filing fee is submitted.
(This and the surcharge required by 37 CFR 1.16(e) can be paid subsequently).

☒ Enclosed

☒ filing fee $ 790

☐ recording assignment ($40.00; 37 CFR 1.21(h)) (See attached "COVER SHEET FOR ASSIGNMENT ACCOMPANYING NEW PATENT APPLICATION".)

☐ processing and retention fee ($130.00; 37 CFR 1.53(d) and 1.21(l)) $_____

NOTE: 37 CFR 1.21(l) establishes a fee for processing and retaining any application which is abandoned for failing to complete the application pursuant to 37 CFR 1.53(d) and this, as well as the changes to 37 CFR 1.53 and 1.78 indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid or else the processing and retention fee of § 1.21(l) must be paid within 1 year from notification under § 53(d).

Total fees enclosed $_____

13. Method of Payment of Fees

☐ Enclosed is a check in the amount of $_____.

☒ Charge Account No. 04-1077 in the amount of $ 790.
A duplicate of this request is attached.

NOTE: Fees should be itemized in such a manner that is clear for which purpose the fees are paid. 37 CFR 1.22(b).

14. Authorization To Charge Additional Fees

WARNING: *If no fees are being paid on filing do not complete this item.*

WARNING: *Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges if extra claim charges are authorized.*

☒ The Commissioner is hereby authorized to charge the following additional fees which may be required by this paper and during the entire pendency of the application to Account No. 04-1077

☒ 37 C.F.R. 1.16 (a), (f) or (g) (filing fees)

☒ 37 C.F.R. 1.16 (b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 CFR 1.16(d)) it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

☒ 37 C.F.R. 1.17 (application processing fees)

WARNING: *While 37 CFR 1.17(a), (b), (c) and (d) deal with extensions of time under § 1.136(a) this authorization should be made only with the knowledge that: "Submission of the appropriate extension fee under 37 CFR 1.136(a) is to no avail unless a request or petition for extension is filed." [emphasis added]. Notice of November 5, 1985 (1060 O.G. 27).*

☐ 37 C.F.R. 1.18 (issue fee at or before mailing Notice of Allowance, pursuant to 37 CFR 1.311(b)).

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 CFR 1.311(b)).

NOTE: 37 CFR 1.28(b) requires "Notification of any change in status resulting in loss of entitlement to small entity status must be filed in the application . . . prior to paying or at the time of paying . . . issue fee. . ." From the wording of 37 CFR 1.28(b): (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

15. Power of Attorney

☒ The power of attorney in the prior application is to

RALPH E. JOCKE — 31,029

Attorney — Reg. No.

a. ☒ The power appears in the original papers in the prior application.

b. ☐ Because the power does not appear in the original papers, a copy of the power in the prior application is enclosed.

c. ☐ A new power has been executed and is attached.

d. ☒ Address all future communications to

(item d may only be completed by applicant, or attorney or agent of record)

RALPH E. JOCKE
231 SOUTH BROADWAY
MEDINA, OHIO 44256

16. Maintenance of Copendency of Prior Application

(this item must be completed and the papers filed in the prior application if the period set in the prior application has run)

☐ A petition, fee and response has been filed to extend the term in the pending prior application until _____.

NOTE: The PTO finds it useful if a copy of the petition filed in the prior application extending the term for response is filed with the papers constituting the filing of the Continuation Application. Notice of November 5, 1985 (1060 O.G. 27).

☐ A copy of the petition for extension of time in the prior application is attached.

17. Conditional Petition for Extension of Time in Prior Application

(complete this item and file conditional petition in the prior application if previous item not applicable)

☐ A conditional petition for extension of time is being filed in the pending parent application.

NOTE: The PTO finds it useful if a copy of the petition filed in the prior application extending the term for response is filed with the paper constituting the filing of the continuation application. Notice of Nov. 5, 1985 (1060 O.G. 27).

☐ A copy of the conditional petition for extension of time in the prior application is attached.

18. Abandonment of Prior Application (*if applicable*)

WARNING: *Do not complete this item if the application being filed is a divisional of the prior application that is not being abandoned.*

NOTE: "A registered attorney or agent acting under the provisions of § 1.34(a), or of record, may also expressly abandon a prior application as of the filing date granted to a continuing application when filing such a continuing application." 37 CFR 1.138.

☐ Please abandon the prior application at a time while the prior application is pending or when the petition for extension of time or to revive in that application is granted and when this application is granted a filing date so as to make this application copending with said prior application.

19. Notification in Parent Application of the Filing of This Continuation Application

☐ A notification of the filing of this continuation is being filed in the parent application from which this application claims priority under 35 U.S.C. § 120.

20. Statement by Assignee (*if applicable*)

☒ In accordance with 37 CFR 3.73, I have reviewed the evidentiary documents establishing my/our ownership of the application identified herein, and certify that to the best of my/our knowledge and belief, title is with me/us who seek to take action.

☐ Assignment submitted herewith for recordal

I hereby declare further that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issuing thereon.

RALPH E. JOCKE

(type or print name of person signing declaration)

JANUARY 27, 1998

Date

Signature

231 SOUTH BROADWAY

P.O. Address of Signatory

MEDINA, OHIO 44256

☐ Inventor
☐ Assignee of complete interest

(if applicable)

☐ Person authorized to sign on behalf of assignee
☒ Practitioner of record
☐ Filed under Rule 34(a)
Registration No.:

Tel. No.:(330) 722-5143
Reg. No. 31,029

Customer No.:

(complete the following, if applicable)

(type name of assignee)

Title of person authorized to sign on behalf of assignee

Address of assignee

Assignment recorded in PTO on

Reel _____

Frame _____

The statement under 37 C.F.R. 3.73(b)

☐ has been filed in the parent application.

☐ a copy of the statement previously filed in the parent application is attached.

D-1056 DIV 3

IN THE UNITED STATES PATENT AND TRADEMARK OFFICE

In Re Application of:	)	
R. Michael McGrady	)	Art Unit: 2786
	)	
Serial No.: **(Division of 08/361,783)**	)	Examiner Paul P. Gordon
	)	
Filed: **Herewith**	)	

For: **Inventory Monitoring and Dispensing System for Medical Items**

Box Patent Application
Assistant Commissioner for Patents
Washington, D.C. 20231

PRELIMINARY AMENDMENT

Sir:

Kindly amend the above-identified Application prior to examination as follows:

In the Title:

Kindly change the Title to:

--Method For Tracking and Dispensing Medical Items--.

In The Names Of The Inventors:

Kindly change the order of the names of the inventors to be: R. Michael McGrady, Eric R. Colburn, Max A. Fedor, Daniel W. Neu, Robert G. Gillio.

In the Claims:

Kindly cancel claim 1 without prejudice.

Kindly add the following new claims 38-47:

38. A method for tracking and dispensing medical items comprising the steps of:

placing at least one unit of a plurality of types of medical items in a plurality of storage locations, wherein each storage location holds only one type of medical item at a time;

inputting patient identifying data to a data entry device, wherein the patient identifying data corresponds to a patient;

removing one unit of a type medical item from a storage location with a dispenser mechanism;

modifying a data store using a processor in operative connection with the data store, wherein the processor is in operative connection with the data entry device and the dispenser mechanism, wherein the data store includes data representative of the patient and data representative of the type medical item stored in the storage location, and wherein the data store is modified responsive

to the removing step and the inputting step, to include data representative of the dispense of the type medical item for the patient.

39. The method according to claim 38 and wherein the data store further includes data representative of a plurality of authorized users, and prior to the removing step further comprising the steps of:

receiving user identifying data from a user through a user data entry device;

determining with the processor whether the input user identifying data corresponds to data for an authorized user stored in the data store, wherein the processor operatively controls the dispenser device to enable performance of the removing step only when the input user identifying data corresponds to an authorized user.

40. The method according to claim 39 wherein in the modifying step the data store is further modified to include data representative of a record that the authorized user determined is the determining step dispensed the type medical item.

41. The method according to claim 39 and prior to the removing step further comprising the steps of:

further receiving user identifying data from a further user through the user data entry device; and

further determining with the processor whether the input user identifying data from the further user corresponds to data for an authorized user stored in the data store, other than the authorized user determined in the first determining step, and wherein the removing step is enabled to be performed only when the data received in the receiving and further receiving steps corresponds to two different authorized users.

42. The method according to claim 39 wherein the receiving step includes receiving data read from an object and receiving manually input data.

43. The method according to claim 38 and after the removing step further comprising the step of:

sensing with a verification sensor the dispense of the type medical item removed in the removing step, wherein the verification sensor is in operative connection with the processor, and wherein the modifying step is not performed if the dispense of the item is not sensed in the sensing step by the verification sensor in the sensing step.

44. The method according to claim 38 wherein the data entry device includes a touch screen, wherein patient identifying indicia is displayed on the touch screen, and wherein the inputting step includes touching the touch screen in an area adjacent the displayed patient identifying indicia.

45. The method according to claim 38 wherein the removing step includes opening an electronic lock drawer.

46. The method according to claim 38 wherein the removing step includes releasing one container from a magazine holding a plurality of containers.

47. The method according to claim 38 wherein the removing step includes opening a lock to enable access to a storage location.

Remarks

Claims 38-47 are now pending. No additional claim fees are due.

Respectfully submitted,

Ralph E. Jocke Reg. No. 31,029
231 South Broadway
Medina, Ohio 44256
330-722-5143

RETAIN THIS NUMBER-CUSTOMER RECEIPT WILL BE MAILED TO YOU.

RB644818O1X US

Attorney's Docket No. D-1056

PATENT

Box Patent Application
Commissioner of Patents and Trademarks
Washington, D.C. 20231

NEW APPLICATION TRANSMITTAL

Transmitted herewith for filing is the patent application of

Inventor(s): Max A. Fedor
Eric R. Colburn
Daniel W. Neu
Robert G. Gillio
R. Michael McGrady

WARNING: *Patent must be applied for in the name(s) of all of the actual inventor(s). 37 CFR 1.41(a) and 1.53(b).*

For (title): Inventory Monitoring and Dispensing System For Medical Items

1. Type of Application

This new application is for a(n) (*check one applicable item below*):

- ☒ Original
- ☐ Design
- ☐ Plant

WARNING: Do not use this transmittal for a completion in the U.S. of an International Application under 35 U.S.C. 371(c)(4) unless the International Application is being filed as a divisional, continuation or continuation-in-part application.

NOTE: If one of the following 3 items apply, then complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF A PRIOR U.S. APPLICATION CLAIMED and a NOTIFICATION IN PARENT APPLICATION OF THE FILING OF THIS CONTINUATION APPLICATION.

- ☐ Divisional.
- ☐ Continuation.
- ☒ Continuation-in-part (C-I-P).

CERTIFICATION UNDER 37 CFR 1.10

I hereby certify that this New Application Transmittal and the documents referred to as enclosed therein are being deposited with the United States Postal Service on this date December 16, 1994 in an envelope as "Express Mail Post Office to Addressee" Mailing Label Number RB644818O1X US addressed to the: Commissioner of Patents and Trademarks, Washington, D.C. 20231.

Ralph E. Jocke
(type or print name of person mailing paper)

(Signature of person mailing paper)

NOTE: Each paper or fee referred to as enclosed herein has the number of the "Express Mail" mailing label placed thereon prior to mailing. 37 CFR 1.10(b).

WARNING: *Certificate of mailing (first class) or facsimile transmission procedures of 37 CFR 1.8 cannot be used to obtain a date of mailing or transmission for this correspondence.*

2. Benefit of Prior U.S. Application(s) (35 U.S.C. 120)

NOTE: If the new application being transmitted is a divisional, continuation or a continuation-in-part of a parent case, or where the parent case is an International Application which designated the U.S., then check the following item and complete and attach ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

☒ The new application being transmitted claims the benefit of prior U.S. application(s) and enclosed are ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

3. Papers Enclosed Which Are Required For Filing Date Under 37 CFR 1.53(b) (Regular) or 37 CFR 1.153 (Design) Application

47 Pages of specification

13 Pages of claims

1 Pages of Abstract

20 Sheets of drawing

☐ formal

☒ informal

WARNING: DO NOT submit original drawings. A high quality copy of the drawings should be supplied when filing a patent application. The drawings that are submitted to the Office must be on strong, white, smooth, and non-shiny paper and meet the standards according to § 1.84. If corrections to the drawings are necessary, they should be made to the original drawing and a high-quality copy of the corrected original drawing then submitted to the Office. Only one copy is required or desired. Comments on proposed new 37 CFR 1.84. Notice of March 9, 1988 (1990 O.G. 57-62).

NOTE: "Identifying indicia, if provided, should include the application number or the title of the invention, inventor's name, docket number (if any), and the name and telephone number of a person to call if the Office is unable to match the drawings to the proper application. This information should be placed on the back of each sheet of drawing a minimum distance of 1.5 cm. (5/8 inch) down from the top of the page." 37 C.F.R. 1.84(c)).

(complete the following, if applicable)

☐ The enclosed drawing(s) are photograph(s), and there is also attached a "PETITION TO ACCEPT PHOTOGRAPH(S) AS DRAWING(S)". 37 C.F.R. 1.84(b).

4. Additional papers enclosed

☐ Preliminary Amendment

☒ Information Disclosure Statement (37 CFR 1.98)

☒ Form PTO-1449

☐ Citations

☐ Declaration of Biological Deposit

☐ Submission of "Sequence Listing," computer readable copy and/or amendment pertaining thereto for biotechnology invention containing nucleotide and/or amino acid sequence.

☐ Authorization of Attorney(s) to Accept and Follow Instructions from Representative

☐ Special Comments

☐ Other

5. Declaration or oath

☒ Enclosed

executed by *(check all applicable boxes)*

☒ inventor(s).

☐ legal representative of inventor(s). 37 CFR 1.42 or 1.43

☐ joint inventor or person showing a proprietary interest on behalf of inventor who refused to sign or cannot be reached.

☐ this is the petition required by 37 CFR 1.47 and the statement required by 37 CFR 1.47 is also attached. *See item 13 below for fee.*

☐ Not Enclosed.

WARNING: Where the filing is a completion in the U.S. of an International Application but where a declaration is not available or where the completion of the U.S. application contains subject matter in addition to the International Application the application may be treated as a continuation or continuation-in-part, as the case may be, utilizing ADDED PAGE FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION CLAIMED.

☐ Application is made by a person authorized under 37 CFR 1.41(c) on behalf of *all the above named inventor(s).* (The declaration or oath, along with the surcharge required by 37 CFR 1.16(e) can be filed subsequently).

NOTE: It is important that all the correct inventor(s) are named for filing under 37 CFR 1.41(c) and 1.53(b).

☐ Showing that the filing is authorized. (*Not required unless called into question. 37 CFR 1.41(d).*

6. Inventorship Statement

WARNING: If the named inventors are each not the inventors of all the claims an explanation, including the ownership of the various claims at the time the last claimed invention was made, should be submitted.

The inventorship for all the claims in this application are:

☒ The same

or

☐ Are not the same. An explanation, including the ownership of the various claims at the time the last claimed invention was made,

☐ is submitted.

☐ will be submitted.

7. Language

NOTE: An application including a signed oath or declaration may be filed in a language other than English. A verified English translation of the non-English language application and the processing fee of $130.00 required by 37 CFR 1.17(k) is required to be filed with the application or within such time as may be set by the Office. 37 CFR 1.52(d).

NOTE: A non-English oath or declaration in the form provided or approved by the PTO need not be translated. 37 CFR 1.69(b).

☒ English

☐ non-English

☐ the attached translation is a verified translation. 37 CFR 1.52(d).

8. Assignment

☒ An assignment of the invention to MedSelect Systems, Inc.

☒ is attached. A separate ☐ "COVER SHEET FOR ASSIGNMENT (DOCUMENT) ACCOMPANYING NEW PATENT APPLICATION" or ☒ FORM PTO 1595 is also attached.

☐ will follow.

NOTE: "If an assignment is submitted with a new application, send two separate letters-one for the application and one for the assignment." Notice of May 4, 1990 (1114 O.G. 77-78).

WARNING: A newly executed "CERTIFICATE UNDER 37 CFR 3.73(b)" must be filed when a continuation-in-part application is filed by an assignee. Notice of April 30, 1993, 1150 O.G. 62-64.

9. Certified Copy

Certified copy(ies) of application(s)

(country)	*(appln. no.)*	*(filed)*
(country)	*(appln. no.)*	*(filed)*
(country)	*(appln. no.)*	*(filed)*

from which priority is claimed

☐ is (are) attached.

☐ will follow.

NOTE: The foreign application forming the basis for the claim for priority must be referred to in the oath or declaration. 37 CFR 1.55(a) and 1.63.

NOTE: This item is for any foreign priority for which the application being filed directly relates. If any parent U.S. application or International Application from which this application claims benefit under 35 U.S.C. 120 is itself entitled to priority from a prior foreign application then complete item 18 on the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED.

10. Fee Calculation (37 CFR 1.16)

A. ☒ Regular application

CLAIMS AS FILED				
Number filed	Number Extra		Rate	Basic Fee 37 CFR 1.16(a) ~~$710.00~~ 730.00
Total Claims (37 CFR 1.16(c))	37 − 20 = 17	X	$ 22.00	374.00
Independent Claims (37 CFR 1.16(b))	5 − 3 = 2	X	$ 74.00	148.00
Multiple dependent claim(s), if any (37 CFR 1.16(d))		+	$230.00	

☐ Amendment cancelling extra claims enclosed.

☐ Amendment deleting multiple-dependencies enclosed.

☐ Fee for extra claims is not being paid at this time.

NOTE: If the fees for extra claims are not paid on filing they must be paid or the claims cancelled by amendment, prior to the expiration of the time period set for response by the Patent and Trademark Office in any notice of fee deficiency. 37 CFR 1.16(d).

Filing Fee Calculation $1,252.00

B. ☐ Design application ($290.00—37 CFR 1.16(f))

Filing Fee Calculation $_____

C. ☐ Plant application ($480.00—37 CFR 1.16(g))

Filing fee calculation $_____

11. Small Entity Statement(s)

☐ Verified Statement(s) that this is a filing by a small entity under 37 CFR 1.9 and 1.27 is(are) attached.

Filing Fee Calculation (50% of A, B or C above) $_____

NOTE: Any excess of the full fee paid will be refunded if a verified statement and a refund request are filed within 2 months of the date of timely payment of a full fee. 37 CFR 1.28(a).

12. Request for International-Type Search (37 CFR 1.104(d)) *(complete, if applicable)*

☐ Please prepare an international-type search report for this application at the time when national examination on the merits takes place.

13. Fee Payment Being Made At This Time

☐ Not Enclosed

☐ No filing fee is to be paid at this time. (*This and the surcharge required by 37 CFR 1.16(e) can be paid subsequently.*)

☒ Enclosed

☒ basic filing fee $1,252.00

☒ recording assignment ($40.00; 37 CFR 1.21(h)) (See attached "COVER SHEET FOR ASSIGNMENT ACCOMPANYING NEW APPLICATION".)

☐ petition fee for filing by other than all the inventors or person on behalf of the inventor where inventor refused to sign or cannot be reached. ($130.00; 37 CFR 1.47 and 1.17(h)) $_____

☐ for processing an application with a specification in a non-English language. ($130.00; 37 CFR 1.52(d) and 1.17(k) $_____

☐ processing and retention fee ($130.00; 37 CFR 1.53(d) and 1.21(l))

☐ fee for international-type search report ($40.00; 37 CFR 1.21(e)). $_____

NOTE: 37 CFR 1.21(l) establishes a fee for processing and retaining any application which is abandoned for failing to complete the application pursuant to 37 CFR 1.53(d) and this, as well as the changes to 37 CFR 1.53 and 1.78, indicate that in order to obtain the benefit of a prior U.S. application, either the basic filing fee must be paid or the processing and retention fee of § 1.21(l) must be paid within 1 year from notification under § 53(d).

Total fees enclosed $1,252.00

14. Method of Payment of Fees

☐ Check in the amount of $_____

☒ Charge Account No. 04-1077 in the amount of $1,252.00. A duplicate of this transmittal is attached.

NOTE: Fees should be itemized in such a manner that it is clear for which purpose the fees are paid. 37 CFR 1.22(b).

15. Authorization to Charge Additional Fees

WARNING: *If no fees are to be paid on filing the following items should not be completed.*

WARNING: *Accurately count claims, especially multiple dependent claims, to avoid unexpected high charges, if extra claim charges are authorized.*

☒ The Commissioner is hereby authorized to charge the following additional fees by this paper and during the entire pendency of this application to Account No. 04-1077:

☒ 37 CFR 1.16(a), (f) or (g) (filing fees)

☒ 37 CFR 1.16(b), (c) and (d) (presentation of extra claims)

NOTE: Because additional fees for excess or multiple dependent claims not paid on filing or on later presentation must only be paid or these claims cancelled by amendment prior to the expiration of the time period set for response by the PTO in any notice of fee deficiency (37 CFR 1.16(d)), it might be best not to authorize the PTO to charge additional claim fees, except possibly when dealing with amendments after final action.

☒ 37 CFR 1.16(e) (surcharge for filing the basic filing fee and/or declaration on a date later than the filing date of the application)

☒ 37 CFR 1.17 (application processing fees)

WARNING: While 37 CFR 1.17(a), (b), (c) and (d) deal with extensions of time under § 1.136(a) this authorization should be made only with the knowledge that: "Submission of the appropriate extension fee under 37 C.F.R. 1.136(a) is to no avail unless a request or petition for extension is filed." (Emphasis added). Notice of November 5, 1985 (1060 O.G. 27).

☐ 37 CFR 1.18 (issue fee at or before mailing of Notice of Allowance, pursuant to 37 CFR 1.311(b))

NOTE: Where an authorization to charge the issue fee to a deposit account has been filed before the mailing of a Notice of Allowance, the issue fee will be automatically charged to the deposit account at the time of mailing the notice of allowance. 37 CFR 1.311(b).

NOTE: 37 CFR 1.28(b) requires "Notification of any change in loss of entitlement to small entity status must be filed in the application . . . prior to paying, or at the time of paying, . . . issue fee". From the wording of 37 CFR 1.28(b): (a) notification of change of status must be made even if the fee is paid as "other than a small entity" and (b) no notification is required if the change is to another small entity.

16. Instructions As To Overpayment

☒ Credit Account No. 04-1077

☐ Refund

SIGNATURE OF ATTORNEY

Reg. No. 31,029

Ralph E. Jocke

(type or print name of attorney)

Tel. No. (216) 722-5143

231 South Broadway

(P.O. Address)

Medina, Ohio 44256

☐ **Incorporation by reference of added pages**

(check the following item if the application in this transmittal claims the benefit of prior U.S. application(s) (including an international application entering the U.S. stage as a continuation, divisional or C-I-P application) and complete and attach the ADDED PAGES FOR NEW APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED)

☒ Plus Added Pages For New Application Transmittal Where Benefit Of Prior U.S. Application(s) Claimed

Number of pages added 4

☐ Plus Added Pages For Papers Referred To In Item 4 Above

Number of pages added _____

☐ Plus "Assignment Cover Letter Accompanying New Application"

Number of pages added _____

☐ **Statement Where No Further Pages Added**

(If no further pages form a part of this Transmittal, then end this Transmittal with this page and check the following item:)

☐ This transmittal ends with this page.

Attorney's Docket No. D-1056 ***PATENT***

ADDED PAGES FOR APPLICATION TRANSMITTAL WHERE BENEFIT OF PRIOR U.S. APPLICATION(S) CLAIMED

NOTE: "In order for an application to claim the benefit of a prior filed copending national application, the prior application must name as an inventor at least one inventor named in the later filed application and disclose the named inventor's invention claimed in at least one claim of the later filed application in the manner provided by the first paragraph of 35 U.S.C. 112." 37 CFR 1.78(a).

NOTE: "In addition the prior application must be (1) complete as set forth in § 1.51, or (2) entitled to a filing date as set forth in § 1.53(b) and include the basic filing fee set forth in § 1.16; or (3) entitled to a filing date as set forth in § 1.53(b) and have paid therein the processing and retention fee set forth in § 1.21(l) within the time period set forth in § 1.53(d)." 37 CFR 1.78(a).

17. Relate Back—35 U.S.C. 120

NOTE: "Any application claiming the benefit of a prior filed copending national or international application must contain or be amended to contain in the first sentence of the specification following the title a reference to such prior application identifying it by serial number and filing date or international application number and international filing date and indicating the relationship of the applications." 37 CFR 1.78(a). See also the Notice of April 28, 1987 (1079 O.G. 32 to 46).

☐ Amend the Specification by inserting before the first line the sentence:

"This is a

☐ continuation

☐ continuation-in-part

☐ divisional

of copending application(s)

☐ serial number 0 /_____ filed on _____"

☐ International Application _____ filed on _____ and which designated the U.S."

NOTE: The proper reference to a prior filed PCT application which entered the U.S. national phase is the U.S. serial number and the filing date of the PCT application which designated the U.S.

NOTE: (1) Where the application being transmitted adds subject matter to the International Application then the filing can be as a continuation-in-part or (2) it is desired to do so for other reasons, e.g. where no declaration is available, no English translation is available or no fee is to be paid on filing then the filing can be as a continuation. In these cases the International Application designating the U.S. is treated as the parent case in the U.S. and is an alternative to the completion of the International Application under 35 U.S.C. 371(c)(4) which must meet the requirements of 37 CFR 1.61(a). This alternative permits the completion of the filing requirements within any term set by the PTO under 37 CFR 1.53(d) to which the extension provisions of 37 CFR 1.136(a) apply. (Whereas, if the filing is as an international application entering the U.S. stage then the fee, declaration and/or English translation (where necessary) is due within 20 months of the priority date but can be paid within 22 months of the priority date (or is due within 30 months of the priority date but can be submitted within 32 months of the priority date) with the surcharges set forth in 37 CFR 1.492(e), (f) and 37 CFR 1.495(c); however, the provisions of 37 CFR 1.136 do not apply to this 22 or (32 month) period. 37 CFR 1.61(b).)

NOTE: The deadline for entering the national phase in the U.S. for an international application was clarified in the Notice of April 28, 1987 (1079 O.G. 32 to 46) as follows:

"The Patent and Trademark Office considers the International application to be pending until the 22nd month from the priority date if the United States has been designated and no Demand for International Preliminary Examination has been filed prior to the expiration of the 19th month from the priority date and until the 32nd month from the priority date if a Demand for International Preliminary Examination which elected the United States of America has been filed prior to the expiration of the 19th month from the priority date, provided that a copy of the international application has been communicated to the Patent and Trademark Office within the 20 or 30 month period respectively. If a copy of the international application has not been communicated to the Patent and Trademark Office within the 20 or 30 month period respectively, the international application becomes abandoned as to the United

States 20 or 30 months from the priority date respectivley. These periods have been placed in the rules as paragraph (h) of § 1.494 and paragraph (i) of § 1.495. A continuing application under 35 U.S.C. 365(c) and 120 may be filed anytime during the pendency of the international application."

18. Relate Back—35 U.S.C. 119 Priority Claim for Prior Application

The prior U.S. application(s), including any prior International Application designating the U.S., identified above in item 17, in turn itself claim(s) foreign priority (ies) as follows:

country	appl. no.	filed on

The certified copy (ies) has (have)

☐ been filed on _____ in prior application 0 /_____ which was filed on _____

☐ is (are) attached

WARNING: *The certified copy of the priority application which may have been communicated to the PTO by the International Bureau may **not** be relied on without any need to file a certified copy of the priority application **in the continuing application.** This is so because the certified copy of the priority application communicated by the International Bureau is placed in a folder and is not assigned a U.S. serial number unless the national stage is entered. Such folders are disposed of if the national stage is not entered. Therefore such certified copies may not be available if needed later in the prosecution of a continuing application. An alternative would be to physically remove the priority documents from the folders and transfer them to the continuing application. The resources required to request transfer, retrieve the folders, make suitable record notations, transfer the certified copies, enter and make a record of such copies in the Continuing Application are substantial. Accordingly, the priority documents in folders of international applications which have not entered the national stage may not be relied on. Notice of April 28, 1987 (1079 O.G. 32 to 46).*

19. Maintenance of Copendency of Prior Application

NOTE: *The PTO finds it useful if a copy of the petition filed in the prior application extending the term for response is filed with the papers constituting the filing of the continuation application. Notice of November 5, 1985 (1060 O.G. 27).*

A. ☐ Extension of time in prior application

*(This item **must** be completed and the papers filed **in the prior application** if the period set in the prior application has run)*

☐ A petition, fee and response extends the term in the pending **prior** application until _____

☐ A **copy** of the petition filed in prior application is attached

B. ☐ Conditional Petition for Extension of Time in Prior Application

(complete this item if previous item not applicable)

☐ A conditional petition for extension of time is being filed in the pending **prior** application.

☐ A **copy** of the conditional petition filed in the prior application is attached

20. Further Inventorship Statement Where Benefit of Prior Application(s) Claimed

NOTE: *"If the continuation, continuation-in-part, or divisional application is filed by less than all the inventors named in the prior application a statement **must** accompany the application when filed requesting deletion of the names of the person or persons who are not inventors of the invention being claimed in the continuation, continuation-in-part, or divisional application." 37 CFR 1.62(a) [emphasis added]. (dealing with the file wrapper continuation situation).*

NOTE: *"In the case of a continuation-in-part application which adds and claims additional disclosure by amendment, an oath or declaration as required by § 1.63 must be filed. In those situations where a new oath or declaration is required due to additional subject matter being claimed, additional inventors may be named in the continuing application. In a continuation or divisional application which discloses and claims only subject matter disclosed in a prior application, no additional oath or declaration is required and the application must name as inventors the same or less than all the inventors in the prior application." 37 CFR 1.60(c). (dealing with the continuation situation).*

(complete applicable item (a), (b) and/or (c) below)

(a) ☐ This application discloses and claims only subject matter disclosed in the prior application whose particulars are set out above and the inventor(s) in this application are

☐ the same.

☐ less than those named in the prior application and it is requested that the following inventor(s) identified for the prior application be deleted:

(type name(s) of inventor(s) to be deleted)

(b) ☒ This application discloses and claims additional disclosure by amendment and a new declaration or oath is being filed. With respect to the prior application the inventor(s) in this application are

☐ the same.

☒ the following additional inventor(s) have been added

R. Michael McGrady

(type name(s) of inventor(s) to be added)

(c) The inventorship for all the claims in this application are

☒ the same.

☐ not the same, and an explanation, including the ownership of the various claims at the time the last claimed invention was made

☐ is submitted.

☐ will be submitted.

21. Abandonment of Prior Application (if applicable)

☐ Please abandon the prior application at a time while the prior application is pending or when the petition for extension of time or to revive in that application is granted and when this application is granted a filing date so as to make this application copending with said prior application.

NOTE: According to the Notice of May 13, 1983 (103, TMOG 6-7) the filing of a continuation or continuation-in-part application is a proper response with respect to a petition for extension of time or a petition to revive and should include the express abandonment of the prior application conditioned upon the granting of the petition and the granting of a filing date to the continuing application.

22. Petition for Suspension of Prosecution for the Time Necessary to File an Amendment

WARNING: *"The claims of a new application may be finally rejected in the first Office action in those situations where (1) the new application is a continuing application of, or a substitute for, an earlier application, and (2) all the claims of the new application (a) are drawn to the same invention claimed in the earlier application, and (b) would have been properly finally rejected on the grounds of art of record in the next Office action if they had been entered in the earlier application." MPEP, § 706.07(b).*

NOTE: Where it is possible that the claims on file will give rise to a first action final for this continuation application and for some reason an amendment cannot be filed promptly (e.g., experimental data is being gathered) it may be desirable to file a petition for suspension of prosecution for the time necessary.

(check the next item, if applicable)

☐ There is provided herewith a Petition To Suspend Prosecution for the Time Necessary to File An Amendment (New Application Filed Concurrently)

23. NOTIFICATION IN PARENT APPLICATION OF THIS FILING

☐ A notification of the filing of this
(check one of the following)

☐ continuation
☐ continuation-in-part
☐ divisional

is being filed in the parent application from which this application claims priority under 35 USC § 120.

APPLICATION FOR UNITED STATES LETTERS PATENT

Title: Inventory Monitoring and Dispensing System for Medical Items

Inventors: Max A. Fedor
Eric R. Colburn
Daniel W. Neu
Robert G. Gillio
R. Michael McGrady

CROSS-REFERENCED RELATED APPLICATIONS

This Application is a Continuation in Part of copending Application Serial Number 08/186,285 filed January 25, 1994 which is a Continuation in Part of United States Patent Application Serial Number 08/009,055 filed January 25, 1993.

TECHNICAL FIELD

This invention relates to inventory monitoring and dispensing devices and systems. Particularly this invention relates to apparatus for dispensing and tracking an inventory of medical items used to treat patients in a hospital, clinic or other healthcare setting.

BACKGROUND ART

The treatment of patients in hospitals and clinics usually involves the receipt by the patient of medical items. These items may include consumable items such as medications. Medical treatment may also involve other disposable items such as dressings and bandages or other medical equipment. Items implanted into the patient or used in conjunction with surgical procedures may also be used and consumed during the course of a patient's medical treatment. Examples of such items include splints, catheters or guide wires which are normally used during cardiac catheterization or angioplasty. To serve the needs of its patients, a clinic or hospital must always maintain sufficient stocks of these items on hand.

Further, as medical items are often expensive, the charges associated with their use must be accurately billed to the patient.

Currently most systems for tracking inventory and use of medical equipment items in a hospital or clinic environment are manual systems. The persons responsible for maintaining an inventory of particular items must monitor the use of the items in each storage location within the hospital and order additional supplies when it is noted that the available stocks are running low. Often personnel are only familiar with the stocks available in a particular storage location and as a result, additional stocks may be ordered even though ample supplies are available elsewhere in the same facility.

Certain drugs used in the course of medical treatment are regulated narcotics. Supplies of such drugs must be kept in secure cabinets. Items may be dispensed from the secure cabinets only by two (2) authorized users accessing the material and certifying the manner in which it is used. The use of such narcotics also may require considerable paperwork which takes away valuable time that could be used for treating patients.

The recording of medical items so that the patient may be billed for their use in the course of treatment is also largely a manual operation. The fact of use by the patient must be recorded in the patient's chart for later billing. In some cases items have peel-off labels that include a bar code that can be scanned and used for billing purposes. However, this still requires that

the nurse or medical technician transfer the correct coding to the proper location for later billing.

Complications in billing become even greater when items are removed from inventory to accomplish a planned surgical procedure and then the items are not used. A patient may be charged for use of a particular item which is removed from inventory in anticipation of surgery. If during the surgery the item is not needed, a corresponding credit must be issued when the item is returned to stock. All of these activities take time away from persons who could otherwise devote their time to the treatment of patients. Such tracking and billing practices are also prone to inaccuracies which may cause the hospital or clinic to lose money or which may result in overbilling of the patient.

Thus there exists a need for an apparatus and system for monitoring and dispensing medical items in hospital or clinic environments that can more accurately monitor inventories, dispense medical items and correlate the use of medical items with the patient whose treatment has included their use.

DISCLOSURE OF INVENTION

It is an object of the present invention to provide a system for monitoring an inventory of medical use items to provide an indication of what items have been used.

It is a further object of the present invention to provide a system for monitoring the use of medical use items so that supplies may be replenished before depletion.

It is a further object of the present invention to provide a system for monitoring an inventory of medical use items that monitors a plurality of items in real time.

It is a further object of the present invention to provide a system for monitoring an inventory of medical use items that requires the processing of no paper forms.

It is a further object of the present invention to provide a system for monitoring and dispensing medical use items that indicates the patient whose treatment has involved the medical use items.

It is a further object of the present invention to provide a system for monitoring and dispensing medical use items that can be used to indicate the technician or physician who has used such medical use items.

It is a further object of the present invention to provide a system for monitoring and dispensing medical use items that provides for crediting of a patient's account upon return of an unused item to inventory.

It is a further object of the present invention to provide a system for monitoring and dispensing medical use items that is used to store and dispense restricted items in a secure manner.

It is a further object of the present invention to provide a system for monitoring and dispensing medical use items that can guide a user to select the items that will be used in a particular medical procedure.

It is a further object of the present invention to provide a system for monitoring and dispensing medical use items that may be used to track and dispense a wide variety of various items and to record their use in a clinical or hospital environment.

Further objects of the present invention will be made apparent in the following Best Modes for Carrying Out Invention and the appended claims.

The foregoing objects are accomplished in a preferred embodiment of the invention by a system for monitoring and dispensing medical items in a clinical or hospital environment. This system includes a plurality of item storage locations. A particular type of medical item may be stored in each location. For example, one type of medical item may include a particular type of catheter. Another may be a particular type of medication packaged in a particular dosage. Each location in the system includes at least one unit of the particular type of medical item.

A sensor is positioned adjacent to each location. A sensor is particularly adapted to sense the addition or subtraction of a unit of the particular type of medical item that is stored in the location. As a result, each time a unit of the particular item is added or removed from storage in the location, the sensor senses this and generates a signal.

A counter is connected to each sensor and records the number of units added or removed from each location. The counter holds a count of the change in the number of units at the location since the last time the counter was read.

The counters associated with each location are connected to at least one processor and at least one memory or data store. The data store includes a total of the number of items that are located in storage at the location. Periodically, the processor polls each of the counters and reads the change in the number of units stored therein. Thereafter the processor is operative to update the total number stored in the memory to reflect the number of items currently stored at the location.

Embodiments of the invention include a data terminal which includes a user interface and which terminal is connected to the processing system and the counters. The data store includes records concerning patients, procedures, authorized users of the system and each of the products stored in each of the locations, including pricing information. The user, such as a technician or nurse, uses the interface of the data terminal to identify the particular patient who is to receive the medical items taken by the user. Upon removal of the items from the

storage locations, the use of such items is recorded in the patient record in the data store so that the patient's chart may be automatically updated and the item charged. In addition, a user using the data terminal may review information in the data store concerning procedures and physicians to determine what medical items are required by a physician to conduct a procedure and may remove such items for delivery to an operating room.

In other embodiments, controlled substances such as narcotics, may be dispensed using the system from a dispenser mechanism or an electronic lock drawer. In such embodiments, the user is required to identify himself at the display terminal. This information is processed and compared to authorized user records in the data store to verify that the user is an authorized user. In some embodiments the identifying information on the user may be placed on an encoded object such as a card and the user may be assigned a personal identification number (PIN) that is memorized by the user. The data terminal includes a reader for reading the coded object and for receiving the user's PIN number which has a predetermined relationship to the data on the encoded object. The proper input of the PIN with the corresponding user's coded object verifies that a proper user is requesting to gain access to the items. For some strictly controlled substances two (2) authorized users may be required to input their coded objects and PIN numbers in order to gain access to the controlled items.

As with the previously described embodiment, once the authorized user has provided the necessary identification, the processor operates to cause the desired substance to be dispensed

or made accessible to the user. The user is also required to input the corresponding patient data so that the patient's chart and billing may be updated.

In some embodiments of the invention, the system may interface with other computer systems such as the admission-discharge-transfer (ADT) computer system that the hospital uses to track patients. This is a computer system which is used in a hospital or clinic to track patient location and activity. In addition, the system of the present invention may also be connected to the hospital information system (HIS) which is the record storage facility of the hospital which maintains computerized records concerning patients. As a result, patient activity, record keeping, and billing may be automated through the system of the present invention, along with inventory monitoring. The system of the present invention may also be used to produce a wide variety of reports from the data store related to patients, authorized users, physicians and various types of items used in inventory. Such a system may also be integrated with an automatic ordering system so as to transfer supplies from one location to another where they are needed and/or to automatically place orders for additional supplies with vendors when supply levels reach a limit.

BRIEF DESCRIPTION OF DRAWINGS

Figure 1 is a side cross sectional view of an inventory monitoring apparatus called a hook register used in the system of the present invention.

Figure 2 is a front cross sectional view of the hook register shown in Figure 1.

Figure 3 similar to Figure 1 depicting a medical item being removed from the hook register.

Figure 4 is a partial cut-away top plan view of a further inventory monitoring apparatus of the present invention called a box register.

Figure 5 is a side elevation view of the box register shown in Figure 4 as seen along line v-v of Figure 4.

Figure 6 is an enlarged view of the circled portion VI shown in Figure 5.

Figure 7 is a side view of a lever used in the box register shown in Figures 4 and 5.

Figure 8 is a top plan view of the lever shown in Figure 7.

Figure 9 is a front view of an alternative box register.

Figure 10 is a partial side view of the box register along line 10-10 in Figure 9.

Figure 11 is an enlarged side view of a switch and lever of the box register shown in Figure 9.

Figure 12 is a front, partial cut away view of the lever and switch of the box register shown in Figure 9.

Figure 13 is a schematic view of the system for monitoring and dispensing medical items including the hook registers and box registers.

Figure 14 is a top plan view of a dispenser mechanism for vials containing medications.

Figure 15 is a cut-away side view of the dispenser shown in Figure 14 with the gate members thereof in a first position.

Figure 16 is a view similar to Figure 15 with the gate members of the dispenser in a second position.

Figure 17 is a side view similar to Figure 16 with the gate members in a third position wherein a vial is dispensed from the mechanism.

Figure 18 is a cross sectional view corresponding to the dispenser as shown in Figure 15.

Figure 19 is a side view of the dispenser mechanism corresponding to Figure 16.

Figure 20 is a side view of the dispenser mechanism corresponding to Figure 17.

Figure 21 is a side view of the dispenser mechanism and gate members in the positions shown in Figure 15.

Figure 22 is a side view corresponding to Figure 21 including hidden edge lines.

Figure 23 is a side view of the dispenser mechanism with the gate members in the positions shown in Figure 16.

Figure 24 is a side view of the dispenser mechanism corresponding to Figure 23 including hidden edge lines.

Figure 25 is a side view of the dispenser mechanism with the gate members in the positions shown in Figure 17.

Figure 26 is a side view of the dispenser mechanism corresponding to Figure 25 including hidden edge lines.

Figure 27 is a sectional side view of the dispenser mechanism shown in Figure 14 located inside a medicine dispenser.

BEST MODES FOR CARRYING OUT INVENTION

Referring now to the drawings and particularly to Figures 1 and 2, there is shown therein a first embodiment of an inventory monitoring apparatus of the present invention referred to as a hook register and generally designated by reference numeral 10. Apparatus 10 includes an elongated housing 12 including an upper wall 14, a lower wall 16, side walls 18 and 20, a front wall 22 and a rear wall 24. Housing 12 may be formed of any suitable durable material such as plastic or metal. A clip assembly 26 or similar attachment mechanism is desirably carried by a flange 28 of rear wall 24 whereby the housing may be detachably fastened to a rail or similar support structure 30 affixed to a wall 32 or like surface. As will be discussed in greater detail hereafter, rail 30 may also carry a communications bus 34 or other suitable means for electrically connecting the apparatus 10 to a similar apparatus and to a remote computer and data terminal.

An object support means is designated by reference numeral 36. As illustrated, the object support may assume the form of an elongated rigid or angled rod which may be suitably formed of metal or plastic. A shorter leg 38 of the object support means is affixed such as by threaded fasteners 40 to the rear wall 24 of housing 12. A longer leg 42 of the object support means extends generally longitudinally of the housing 12 and is capable of supporting a plurality of objects 44. Thus, according to the first embodiment, object support means 36 resembles an elongated peg or rod which suspends objects 44 from holes or perforations 46 provided therein (see Figure 2). The longer leg 42 of support means 36 also desirably is

formed with a raised portion 42A to prevent the objects from unintentionally sliding off the object support means.

It will be appreciated that hook register 10 finds beneficial usage with articles or objects which are suitable for suspension and whose inventory it is desirable to monitor. Typical items may include packages containing medical items such as drugs, medical equipment, supplies, including for example, catheters and guide wires for angioplasty or other medical items which should be strictly and accurately monitored because of theft, safety, critical need or other concerns. For this reason, the object support means may assume any form necessary or desirable to support the objects supported thereby. That is, the object support means may be configured as a rack, multiple hooks or pegs or similar cantilevered members, a tee bar or other such equivalent constructions.

A switch actuating means 48 desirably configured as a pivotable lever is mounted generally at its midpoint to housing 12 by a pivot pin 50. In the preferred embodiment, a first end of lever 48 projects through an opening 52 in lower housing wall 16. It is also contemplated that lever 48 may be adapted to project through an opening similar to opening 52 and may be provided in any other wall of housing 12 so long as those components necessary for the proper functioning of the apparatus 10 are correspondingly repositioned to accommodate the desired orientation and operation of lever.

A second end of lever 48 is connected to suitable biasing means 54 which in the preferred embodiment is a spring. In the preferred embodiment, the biasing means is a tension spring, however in other embodiments biasing means such as torsion springs, compression springs, elastomeric means or the like may be used. The biasing means normally biases the lever to a "inoperative" position in which the lever extends generally traverse to the longer leg 42 of the object support means 36 of the hook register as depicted in Figure 1.

It is important that the first end of lever 48 sufficiently project from housing 12 whereby it may be contacted and displaced by a medical item 44 which may be either added to or removed from the object support means. To assure that the lever will interfere with the passage of an object, either into or out of a location on the object support means, a first end of lever 48 is provided with a notch 56. Notch 56 is configured to receive the longer leg 42 of the object support means 36 therein. As a result, when a medical item is removed from its storage location on the object support means, the object contacts and then displaces the lever so as to rotate it outward. The object then passes the lever and once this occurs the biasing means 54 returns the lever to the inoperative position.

A printed circuit board 58 is mounted in the interior of housing 12. Apart from certain circuitry components specifically identified below which are essential to provide an adequate appreciation of the operation of the hook register, it will be understood that circuit board 58 includes printed circuitry and other circuitry components.

Electrical switch means are supported by and electrically connected to the circuit board 58. During operation the switch means serve as part of a sensor that generates signals indicative of the placement of objects into the storage location on object support means 36 or removal of such objects from the storage location. The preferred embodiment of the hook register utilizes a pair of switch elements 60 and 62 as the electrical switch means. In the preferred embodiment, the switch elements are Hall-effect sensors which change states (off-to-on) when a magnetic field is detected within close proximity. Lever 48 carries a compact permanent magnet 64 which serves as an actuator means. The magnetic field produced by magnet 64 is capable of being sensed by switches 60 and 62 to affect changes in their status. The signals indicating changes in the status of the switches are detected by a signal processing circuit 65 which converts the signals to an appropriate form to be received and counted by a microprocessor 66. The microprocessor 66 in the hook register serves as a counter which stores a count therein as later described.

Operation of the hook register 10 is graphically represented in Figure 3. Specifically, the object 44, which is preferably a medical item, is shown at the instant in time when it has fully deflected the lever 48 against the force of the biasing means 54 and has just passed the first end of the lever. At this moment, the permanent magnet 64 is pivoted into a substantially facing relationship with magnetic field detector switch 60. Switch 60 is triggered upon detection of the magnetic field in proximity to the switch element and generates a signal indicating that one object unit has been removed from the object support

means 36.. Once the medical item has passed off the object support means, the biasing means returns the lever to the inoperative position.

Similarly when a medical item is placed on to the object support means 36, the lever 48 is pivoted in an opposite direction. This causes the permanent magnet to trigger the magnetic field detection switch element 62. This generates a signal indicating that one object unit has been added to the storage location on the object support means. Although in the preferred embodiment magnetic field detection switches are used, other suitable switches such as three-way toggle switches, photo sensors, optical encoders, capacitive or inductance sensors and the like may be employed as sensors to achieve and generate the additive and subtractive article registration signals. Likewise, the switch actuating means may assume forms other than a pivotable lever depending on the type of medical item and storage location involved. For example, a linearly reciprocal lever, a flexible flap or noncontact type sensors may be used in other embodiments.

The microprocessor 66 receives through signal processing circuit 65 the signals generated by switches 60 and 62. The microprocessor contains software programs which record and count the state of the switches each time a change is detected. The number and direction of the changes are counted and stored as a count in the microprocessor. In addition, the microprocessor includes a computer program that enables it to be reset upon receipt of signals from a remote location. In the preferred embodiment, the microprocessor also has stored therein a location identifying indicator that is representative of a number and or other

data uniquely associated with the particular hook register. Each hook register and other dispensing apparatus in the system of the preferred embodiment has a location identifying indicator associated therewith.

The electronic circuitry of the inventory monitoring apparatus also has the ability to communicate its count information to other components of the system of the present invention. In each hook register, the processor 66 is connected through a ribbon cable 68 which is connected with an electrical coupling 70. Coupling 70 electronically couples with a communication bus 34. In this manner, circuit board 58 is enabled to receive power from a remote power source and is enabled to transmit and receive data through communication bus 34.

The operation of the hook registers 10 in the inventory monitoring and dispensing system of the of the present invention is best shown with respect to Figure 9. Each of the hook registers is connected to the data bus 34. Each of the hook registers is connected to the data bus 34, which is connected to a hook controller shown schematically as 72. Hook controller 72 includes a processor and a data store therein which are operable to communicate with each of the hook registers 10. The hook controller 72 is operable to periodically poll each of the hook registers 10 on the data bus. The hook controller reads and receives the count information in each of the hook registers and stores it in conjunction with the location identifying information associated with the particular hook register from which the count was received. After the reading of the count information in the register and transmission of the

data to the hook controller 72, the count information in the microprocessor 66 may be erased so a new count can be started. Alternatively, the microprocessor 66 in the hook register may be programmed to store the count information and the time each such count was generated for a period of time while generating new count information. This can be done to assure that usage of items from any hook register can be recovered even in the event of the failure of a hook controller. While Figure 9 shows only four (4) hook registers connected to controller 72, it will be understood by those skilled in the art that many more hook registers may be so connected on the data bus.

As a result of polling each of the hook registers 10, the hook controller 72 has in its associated processor and data store the count of units taken or added in conjunction with the identifying information associated with each hook register. The hook controller 72 is connected by a further data bus 74 to a data terminal 76. Of course other hook controllers and controllers connected to other types of registers may also be connected to data bus 74. The data bus 74 is used to transmit and receive information from the connected controllers to the data terminal 76.

Data terminal 76 includes a display screen 78 which serves as a data output device. In the preferred embodiment, screen 78 is a "touch screen" of the type known in the prior art wherein a user may input data by placing a finger adjacent to icons displayed on the screen. Sensors overlying the screen sense the position of the finger and convert it to input data. As a result, touch screen 78 serves as a graphical user interface which includes a data input

device as well as a data output device. Data terminal 76 in the preferred embodiment further includes a card reader 80. Card reader 80 may be used to read data encoded on a magnetic stripe of a user's identification card. Of course in other embodiments of the invention other equivalent reader means for reading coded objects or for reading a user's fingerprints or retina pattern may be used depending on the level of security desired.

In the operation of the preferred embodiment of the invention, a medical technician who wishes to operate the system and remove medical items from the hook registers 10 operates the display terminal. The terminal screen outputs a visual prompt for the user to identify himself or herself to the system by input of identifying data. In certain embodiments, the identification may be accomplished by the user inputting an identification number assigned to the user by touching the appropriate numbers on a graphical keypad presented on the screen of the display terminal. In other embodiments, the user may be requested to swipe their card in the card reader so that the magnetic stripe thereon may identify the user to the terminal. In embodiments where high security is required, a user may be requested to input both their card and a personnel identification number (PIN) into the display terminal. The PIN has a predetermined relationship to the data on the card, and the data terminal may be operated further only if a proper card and PIN are input.

When a user enters their identifying information at the display terminal, the display terminal communicates through a local area network (LAN) 82 to a remote computer 84 which includes a processor and a data store therein. Computer 84 has preferably greater and faster

processing capabilities and more memory than a display terminal. The computer 84 has stored therein information records associated with authorized users, and if the data input by the user at the display terminal corresponds to a record for an authorized user, then the display terminal will enable the user to operate the system. In alternative embodiments of the system, one or more display terminals may have the additional processing capabilities and the additional memory to perform the functions of computer 84. In such cases the functions performed by the computer 84 may be distributed among the display terminals.

Upon further use of the display terminal, the user may access certain information about patients, procedures or physicians which is stored in records in the data store of the computer 84. In the preferred embodiment, the stored records include information about patients. The user may select a particular patient at the display terminal. This is preferably done by the user scrolling through a displayed list of patient names using "keys" presented graphically on the touch screen. However, other input devices for selecting a patient name may also be used. Upon finding the desired patient name, the user designates that patient's record by touching the patient's name on the screen. Thereafter, the user may remove medical items from the hook registers that are needed by that patient. When this occurs, the number of units of each item removed from a particular hook register is stored as a count in the microprocessor in each hook register. This information is then transferred to the hook controller 72 when the hook register is polled, and is thereafter transferred to the data terminal 76 when the hook controller 72 is accessed through the data bus 74 by the data

terminal. As a result, data representative of both the patient and the location and number of units of medical items used for that patient is available in the data terminal.

When the user signs off the data terminal or selects another patient (indicating that the items for the prior patient have been taken), the data terminal then transmits the information corresponding to the counts and location numbers of the items used for the selected patient through the LAN 82 to the data store in the computer 84. The computer 84 functions to correlate the count and location numbers with a medical item record which indicates the types of items stored and the location. This provides an indication of what was used for the patient. In addition, the processor and memory in the computer 84 serve to update the record related to the patient to indicate that the items taken were used for the patient so that the patient may be charged therefore. The location records related to medical items preferably includes or may be referenced to pricing information so that patient may be automatically billed. In addition, the computer 84 also updates its records concerning the number of medical items remaining in storage in each location.

The computer 84 is operable in the preferred embodiment to maintain a continuous real time record of how many units of medical items are stored in each of the locations. If the number remaining in any location has reached a lower limit, the computer 84 is programmed to provide a warning of the need to replenish the supplies at that location to an administrator terminal or workstation 86. The administrator's workstation 86 is also a computer with a processor and data store and is connected through the LAN. It has input devices such as the

keyboard and mouse shown and an output device such as the screen shown. The terminal 86 may also have other input and output means such as a touch screen, spoken word recognition, audio output or signal outputs connected to printers or other devices. Of course, the need to replenish the supplies may be indicated on the screen at the administrator's workstation or in other output locations including the data terminals in the area where the hook registers need to be replenished.

In other embodiments, the data terminal may be used to help medical technicians or nurses select medical items for patients. The computer 84 also preferably includes records related to medical procedures as well as physicians in its data store. This information may be accessed at the display terminal by the medical technician or nurse who is obtaining supplies for use in such a procedure. By accessing the stored data records related to the procedure, the technician can read a record which includes information such as the items that are normally used in such a procedure. As a result, the technician may note these items and may remove them from the hook registers while viewing the procedure record to ensure that everything normally needed is transferred to the operating room. In addition, the procedure records may be accessed in connection with a physician record related to a physician who will perform the procedure. Such records may include additional medical items that the particular physician requires to have present in an operating room when conducting a particular procedure. This may include additional medical items or particular types of medical items that the physician prefers. It may also include convenience information such

as the particular type of music the physician prefers to have played in the operating room during a procedure or other items that the particular physician prefers to have available.

In other embodiments of the invention, computer 84 may be programmed to have in its data store, and may provide in response to a request at a display terminal, a schedule of procedures in a particular hospital operating theater. This enables the medical technician or nurse participating in the procedure to locate the patient scheduled for a procedure using the display terminal, and to access therewith the records related to the physician and the medical items that will be needed for the procedure. As a result, the technician or nurse may go to the hook registers, obtain the necessary medical items and have them immediately charged to the patient's account. If after the procedure not all of the items that were originally taken were used, the items may be returned to inventory and credited to the patient's account. This is done by the user identifying himself or herself to the display terminal 76 and again identifying the patient to the system using the touch screen 78 in the manner previously described. Replacing the unused items back on the hook registers 10 automatically creates a record that such items were returned and the patient's account will be credited in the computer 84.

Because of the large number of records that are stored in the data store of the computer 84 and other connected computers, a large number of reports related to inventory usage may be generated. This can be accomplished by using database software such as Paradox® in computer 84. Alternatively, other relational database software may be used. Further,

because the inventory at each location is monitored, messages requesting transfers of inventory from areas where there are excess units to areas where there is a need can be automatically generated by the computer and displayed at the administrator's workstation. The computer 84 also keeps a running tally of what has been used by each patient as well as what has been taken by each user and used by patients of each physician. This further allows monitoring of usage and allow potential abuses to be uncovered. The computer 84 is ideally programmed to look for patterns of dispensing activity that have been programmed into the computer's memory as potential abuses and to display a report thereof at the administrator's workstation. Such potential abuses may include taking particular items at abnormally frequent intervals. The computer 84 may also be programmed to provide reports from the database concerning what particular users have dispensed during a given time period and what particular physicians have used or prescribed for patients.

In the preferred embodiment of the system of the present invention, the administrator's workstation 86 is used as the primary tool for the monitoring of inventory. The administrator's workstation is used to program the particular type of medical item stored in the location at each of the hook register and in other types of registers in the system. This is done by creating a record for each location in the data store. The administrator's workstation is also used to set the level of the minimum acceptable number of units of each item at each location so that an indication may be given of a need to replenish or transfer stock. This is programmed as a minimum for each location, and an indication is given when the minimum is reached. Further, the administrator's workstation preferably includes

electronic ordering capability so that when supplies of a particular item are reduced to a particular level, a purchase order to replenish the stock is sent automatically to the manufacturer. The ordering and source information is also optimally part of or referenced with the associated record with the item in the data store. As a result, the administrator's workstation is programmed so that when the quantity of an item on hand falls to a particular level, an order is communicated to the manufacturer of the needed item directly over a telephone or other data line via a modem, indicating electronically the item needed, an order quantity and a date by which the items must be received. The order quantity data may be preprogrammed or may be calculated automatically by the computer using a program that generates the order quantity based on rate of use. Likewise, the delivery date may be a programmed time period after issuance of the order, but may also be programmed to be a rush order if the "on hand" quantity has fallen to a second lower level or if the use rate is above a programmed level.

The administrator's workstation may also be used to establish records for authorized users and to set varying levels of security for authorized users at different types of display terminals. Although in the preferred embodiment, the administrator's workstation is the primary control for the system of the present invention as shown in Figure 9, the hospital's other computer systems including the admission-discharge-transfer (ADT) system 88 and the hospital information system (HIS) 90 are also connected to the local area network 82. This enables the patient data in the computer 84 to be input and output to the ADT system 88 and records relating to patient activity or other activities to be received from or stored in the

HIS, which is typically the long term data storage facility related to patients. The system may also be connected to other computer systems in the institution such as systems in the pharmacy or dietary and food services. Each of these systems may contain multiple processors and data stores which transmit selected data to and from the LAN 82. This enables the exchange of data throughout the hospital's computers which facilitates both record keeping, patient billing and monitoring of its inventory.

The hook registers 10 which are optimally constructed for supporting hanging items are only one type of dispensing device that can be used with the present invention. Figures 4 through 6 reflect a further embodiment of an inventory monitoring apparatus designated by the numeral 110. Apparatus 110 is called a box register as it is optimally adapted to include storage locations for holding boxes or box-like articles. Box register 110 includes an elongated housing 112 including an upper wall 115, a lower wall 116, end walls 118 and 120, a front wall 122 and a rear wall 124. Like housing 12 of hook register 10, housing 122 may be fabricated from any durable material such as plastic or metal. Although not shown, it will be understood that a clip assembly similar to clip assembly 26 of Figures 1 and 2 or a similar attachment mechanism may be used to detachably fasten the housing to a wall. Alternatively, apparatus 110 may rest on a level shelf, tabletop or reside in a cabinet. Each box register 110 is connected to a communication bus 74 (see Figure 9).

With regard to the box register, in this embodiment, an object support means is represented by reference numeral 136 which support means may assume the form of a receptacle having

at least one or preferably a plurality of compartments or object storage sites 138 which are locations wherein medical items may be stored. In this embodiment, object support means 136 is constructed as a multiple compartment, heavy gage, stiff metal wire rack including a pair of upright truss-like end walls 139, a plurality of spaced apart storage site divider walls 140 situated between and generally parallel to the end walls 139 and a plurality of transverse members 141 affixed to the end walls 139 and divider walls 140. The end walls 139 are desirably secured by suitable mechanical fastening means 142, such as nuts and bolts or the like to lower wall 116 (as shown) or any other wall of the housing 112.

As shown in the figures, the object support means 136 is adapted to support objects 144 of substantially uniform dimensions (one of which is shown in phantom in Figures 4 through 6) in a substantially upright orientation. For example, objects 144 may be generally uniformly sized relatively thin boxes or similar packages which may contain various designated types of medical products. The object support means as illustrated is thus capable of supporting an object on four sides thereof, i.e. the bottom, back and both lateral sides of the object (see Figures 4 and 5). In this fashion, an object 144 may be removed from the object support means 136 by lifting it forward (to the right as shown in Figure 5) and/or upward. The bases of the divider walls 140 are situated at a lower elevation than the upper wall 114 of housing 12 (Figure 5) whereby the objects 144 are caused to be tilted slightly rearwardly such that the back sides of the objects maintain contact with the rear of the object support means 136.

Although the described embodiment of the object support means 136 supports the objects 144 such as boxes in substantially upright or vertical position, the present invention also contemplates rack geometries whereby objects may be supported substantially horizontally, at acute angles or in a staggered array incorporating one or more angular support orientations. Further, the spacing between the divider walls 140 need not be uniform in which case storage sites 138 of variable dimensions may be provided in the same object support means 136. Of course the object support means 136, like housing 112, may be fabricated of metal or from any high strength substantially rigid plastic or other suitable material.

Box register 110 includes switch activating means 148. The switch activating means 148 includes one or more levers pivotally mounted at 150 (see Figure 6) to housing 112 in a manner described hereafter. The levers 148 correspond in number to the number of compartments 138 which are the storage locations provided in the object support means 136. A first end of each lever 148 projects from the housing 112 into a respective one of the storage sites 138 and a second end of each lever extends into the housing as most clearly seen in Figure 6. The first end of each lever protrudes from the housing for a distance sufficient to be contacted and displaced by an object 144 when such object is added to the object support means 136. Biasing means later discussed return the levers to inoperative positions upon removal of an object from the corresponding storage site.

Referring to Figures 4 and 6, as is the case with the hook registers described above, the box registers likewise have printed circuit boards therein designated 158 one of which is shown.

Circuit boards 158 are mounted in the interior of housing 112. Circuit boards 158 include printed circuitry and other circuitry components which are not illustrated or described in detail except to the extent necessary for a proper understanding of the present invention.

Electrical sensor means are supported by and electrically connected to circuit board 158. The sensor means generate signals indicative of the placement of an object onto and the removal of an object from the object support member 136. According to the preferred embodiment, the sensor means comprises one or more discrete force actuatable switches 160 such as snap-type internally resilient dome switches or other type electrical switches. Switches 160 are spaced apart along the length of circuit board 158 and correspond in number to the levers 148 whereby the second end of each lever operates a separate switch.

The switches 160 generate real time counting signals indicative of the total inventory of objects 144 carried by the object support sites which are occupied and those which are unoccupied at any instant in time. Thus when a lever 148 is caused to pivot in one direction by an object that is placed into a storage location, the second end of the lever closes its respective switch 160. This is reflected by the solid line image of lever 148 depicted in Figures 5 and 6. Switch 160 in turn generates a registration signal indicating that an object has been placed into the storage location and at which storage site the object has been added.

Conversely, when an object is removed from the object support means, the biasing force from the internal resilience of the dome switch 160 returns the lever to its inoperative

position as is reflected by the dash line image of lever 148 illustrated in Figure 5 and 6 whereby the switch is open. In this position, the switch generates a registration signal which reflects that an object has been removed from the storage location. Additionally, if mechanical switches other than dome type or other similar switches possessing internal resiliency are employed as the electrical switch means, then biasing means-such as springs or elastomeric means may be provided to assure that the switches change electrical condition upon removal of objects from the object support means 136. Alternatively, certain switch types have built-in springs which provide the biasing force. Although dome type switches are used in embodiments of the box registers, other suitable sensor means such as two-way toggle switches, momentary contact switches, photo sensitive switches, capacitive or inductance sensors and the like may be employed to affect the generation of additive, subtractive and object locating registration symbols.

Figures 7 to 8 show on an enlarged scale a lever 148. The lever desirably includes a pair of opposed notches 161, 162 which generally separate the lever into its first and second ends and, in cooperation with mating slots provided in the front wall 122 of housing 112, establish the pivotal connection 150 of the lever relative to the housing. Further, each lever 148 is preferably provided with a downwardly sloping lip 163 at the leading edge of its first end to facilitate insertion of the objects 144 into the storage sites 138.

The signals indicating changes in the status of the switches 160 are transmitted by wire or other acceptable signal conducting means 164 whereupon they are detected by a signal

processing circuit 165 which converts the signals to an appropriate form to be received and counted by a microprocessor 166. The microprocessor 166, like microprocessor 66 of the hook registers 10 described above, contains software programs which record the state of the switches each time a change is detected. The microprocessor 166 also counts and stores a count indicative of the number and direction of changes in state as they occur. Further, the microprocessor 166 includes the unique location identifying indicator associated with each of the storage locations in which any changes in the presence of a medical item have occurred. Alternatively, the microprocessor 166 may keep track of the times such changes have occurred.

While not illustrated it will be appreciated that the hook and box registers are preferably remotely powered through the associated bus connections. In other embodiments they may be locally powered. Further, in other embodiments the registers may include LED or LCD displays on the registers for indicating the powered condition of the particular register or the fact of a change in the status of inventory items at the location. Of course suitable LED or LCD indicators may also be used for other purposes such as indicating the particular type of item to be stored, that the register is in a restocking mode, or that the amount of inventory stored in the location has fallen below a critical level. This is accomplished by programming in computer 84, or programming in the other processors connected to LAN 82 to output such an indication under such conditions.

An alternative embodiment of a box register 110' is shown in Figures 9 through 12. Box register 110' is similar to the previously described box register 110 except as expressly noted herein. The box register 110' includes a plurality of compartments 126 which are separated by divider walls 128. Each compartment has located therein a lever 130, which is movable about a pivot 132 (see Figures 11 and 12). The lever includes an object engaging leg 123 and a switch actuating leg 133. The leg 133 is engageable with an actuating projection 134 of a switch 135. The switch 135 includes an internal spring which biases the actuating projection outward from the switch. The switch operates to change its electrical condition when the actuating projection is depressed.

Objects or items such as boxes holding medical supplies are stored in the compartments 126. The presence of an object in the compartment engages the object engaging leg 123 and moves the associated lever 130 to the position shown in phantom in Figure 11. In this position lever 130 is in abutting relation with a stop member 152 which bounds the rear of the compartment. The stop 152 prevents the object engaging leg of lever 130 from being rotated rearward beyond the position shown in phantom. When object engaging leg 123 is in engagement with stop 152, switch actuating leg 133 depresses actuating projection 134 of switch 135 resulting in the switch having a first electrical condition.

Upon removal of the box or other object from the compartment, actuating projection 134 moves outward in response to the biasing force of the internal spring as the object disengages lever 130. Outward movement of actuating projection 134 causes switch 135 to change its

electrical condition. As in the earlier described embodiment of the box register this change is noted in conjunction with the location information in the box register's associated microprocessor, similar to microprocessor 166.

Although the box registers shown are a single tiered rack, the object support means may comprise a multi-tiered rack or a plurality of rows and/or columns of cubicals whereby each of the storage sites or cubicals may be appropriately fitted with a switch actuating means such as a lever.

In the preferred form of the invention, the box registers are connected through bus 74 with the display terminal 76. The display terminal periodically reads the count information in the microprocessor 166 associated with each of the box registers and receives changes in the count information associated with each of the storage locations in the box registers.

A user may operate display terminal 76 to indicate the appropriate patient for which material taken from the box registers will be used in the manner previously described with regard to the hook registers. In addition, the administrator's workstation is used in the setup of the system to assign the particular type of medical item to be stored in each location in the box registers which is stored in a record in computer 84. However, unlike the hook registers which may store a substantial number of units of the particular type of medical item in each location, a box register is adapted to store only one such item in each location. Therefore,

in some embodiments several adjacent locations in the box register are designated for containing the same type of medical item.

As is also the case with the hook registers, a user of the system who is replenishing inventory to the box registers may operate the display terminal to so indicate using the touch screen data entry device that he or she is replenishing inventory. In this case, the records in computer 84 will be updated to indicate the units of inventory added in each of the storage locations. No patient is credited for the items stocked in the locations and a record in the data store concerning the number of such items on hand but not yet placed for use in a location is also updated. In alternative embodiments, a bar code is applied on the various items stored in the hook and box registers. A bar code reader or scanner shown schematically as 104 in Figure 5 is positioned in the hook and box registers so that the code on the item is read as it is placed or removed from a location. The bar code scanner generates signals that are interpreted by software for reading bar codes which runs in computer 84 or another terminal in the LAN 82. A data store associated with the software includes information which correlates each bar code identifier with a particular medical item. This provides a check that the item actually stored or taken is the type that is recorded as stored in that location. If an error is made an alarm may be given, either at the register, display terminal and/or the administrator's workstation. Alternatively, the bar code on the medical items may be used to "set up" the system, so that the system records the fact that a particular medical item is stored in a particular location as a result of having read the bar code thereon as the item is placed therein. This avoids the need to program the

Administrator's workstation with this information. The bar code scanner can be provided in addition to the indicator which indicates an item is added or removed. Alternatively, the bar code may be read as each item is removed from a location on a hook or box register and the use for the patient of the item recorded directly in response to reading the bar code signals and identifying the patient at the display terminal.

The information included in the data store with respect to particular items may also include a date by which perishable items must be used. The user stocking such items in the locations can input such information using the input device of the data terminal. Items having a limited shelf life are preferably stored in the box registers where the "use by" date can be uniquely associated as part of the record for the only item in the location.

The system can also be used with other types of devices that are used to indicate that an item has been taken for a patient. One such device is a manual input register where a nurse or other medical technician manually indicates that an item has been taken.

In one embodiment a manual register is structurally similar to box register 110' except that it does not include compartments or levers. The actuating projections of the switches are connected to manually engageable buttons. The system is programmed so that the momentary change in electrical condition of a switch resulting from depression of a particular button represents the taking of one unit of a particular item from storage.

Preferably each button is labelled with indicia representative of the item that it is associated with.

In the case of a manual register, the nurse or medical technician ques up the patient who will receive the items on the screen of the data terminal and touches the screen to select that patient. The user pushes each button on the manual register corresponding to the type of item taken. By pressing the button once for each unit of an item taken, data is stored in the micropressor associated with the manual register which is representative of the particular button location pushed and the corresponding count associated with that button. This information is correlated with the patient record in the same manner as occurs with the hook registers and box registers.

The system of the present invention may also be used in conjunction with other types of dispensing devices. An example of such a device is an electronic lock drawer 96. The electronic lock drawer may be used to store narcotics or other articles, the use of which is highly restricted and which are not suitable for storage in a hook or box type register of the type previously described. Alternatively, the electronic lock drawer may comprise a secure enclosure housing hook registers or box registers in its interior. The function of the electronic lock drawer is to hold the restricted items and provide access thereto by opening a locking mechanism of the unit only when a set of predetermined conditions are satisfied.

In the preferred form of the invention the electronic lock drawer is connected to and the opening thereof controlled through an adjacent data terminal 98. Data terminal 98 is similar to data terminal 76. Data terminal 98 is connected to the electronic lock drawer 96 and is operable to unlock the lock thereto upon receipt of appropriate signals from computer 84. Of course although only one electronic lock drawer is shown in connection with data terminal 98, additional electronic lock drawers may be connected thereto.

In the preferred form of the invention, information about each type of restricted material housed in each electronic lock drawer is stored in a record in the computer 84. To gain access to these materials a user must first identify himself or herself to the data terminal in the manner previously described. Preferably for highly restricted items, computer 84 requires not only a user to input an identification card and PIN number but also a second authorized user to input their coded card and PIN number. The purpose for requiring two (2) authorized users to be present to open the electronic lock drawer is so that the items removed and their disposition may be verified.

Preferably, the computer 84 has stored in the patient record, information about the medications that the patient has been authorized to be given. As a result, the user may use the data terminal to select the patient name and to request the opening of the electronic lock drawer so the user may take the medication for the patient. This is done using the touch screen of the data terminal as an input/output device. Thereafter, upon proper input of a further authorized user's verification information, the electronic lock drawer will unlock in

response to signals sent from the computer 84 to the data terminal 98 and from the data terminal 98 to the lock drawer 96. Thereafter, the user may remove the medication from the lock drawer in the presence of the verification user and reclose the unit. Upon the user inputting a verification input to the data terminal that the medication has been taken, the associated record of use and the charge therefore is automatically added to the patient's account by the computer 84.

It does not matter if a medication that is stored in the electronic lock drawer is not listed as one the patient is authorized to receive in the patient's records in the computer 84, the user may still access the electronic lock drawer. A user may input a request through the data terminal for a listing of medications available. In response the computer 84 outputs to the data terminal a listing of the available medications and the dosages. The computer may also provide information on the location of each medication. The user may then select a particular type of medication and then input through the data terminal a request for a listing of patients which again is provided from the records in the data store of computer 84. By selecting the patient who is to receive the medication (and when appropriate providing the necessary verification from a co-authorized user) the appropriate electronic lock drawer will unlock and allow access to the medication. Upon verification input to the data terminal from the user that the medication has been removed, the computer will charge the patient's account therefore by updating the patient's record. Of course as is the case with the other medical item storage locations previously described, computer 84 also operates to keep track of the inventory of various items inside the electronic lock drawer 96 to assure adequate

stock. The computer is also programmed to record the users and verification users who have removed items from the electronic lock drawer and the types of items taken so that any shortages or patterns of abuse may be automatically noted. Further, as discussed previously, data terminal 98 may be used to access information in the computer concerning procedures and physicians so that items in the electronic lock drawer 96 may be taken to an operating theater in advance of a surgical procedure.

Of course data terminal 98 may be used like data terminal 76 to credit a patient's account for items returned from inventory as well as to indicate replenishment of inventory in the electronic lock drawer. If a narcotic substance is to be returned the computer is programmed to have a verification user verify the returns. Returns are preferably made into special one way receptacles so that returned items can not be removed by unauthorized persons.

Another type of dispenser apparatus that may be used in the system of the present invention is the medicine dispenser 100 shown in Figure 9. Medicine dispenser 100 is also used for dispensing medical items that require high security such as narcotics. However, unlike electronic lock drawer 96, medicine dispenser is operable to dispense only the particular item requested and to restrict access to all the other items housed within the medicine dispenser. As shown in Figure 9 the medicine dispenser is connected to a data terminal 102 that is similar to data terminals 76 and 98. The operation of the data terminal 102 in conjunction with the medicine dispenser 100 is similar to the operation of data terminal 98 in cooperation with electronic lock drawer 96. The difference in the use of the medicine dispenser is that

in response to selection of the particular medical item (and the co-user verification if required) the medicine dispenser will provide to the user a single unit dose of the particular medical item requested. As a result, the user is not required to locate the item as is required with the electronic lock drawer. In addition, the level of security required for dispense of medical items within the medicine dispenser can be varied depending on the level of security required for the particular item. As a result, for some items in the medicine dispenser 100 it may be necessary only to verify that the user is an authorized user. For other substances, only selected authorized users (and co-users) will be given the substance.

The interior of medicine dispenser 100 is shown schematically in Figure 23. Dispenser 100 encloses a plurality of dispenser magazines 168 only one of which is shown. Each magazine holds a plurality of vials 170 which are held in inclined relation in the magazine. Each of the vials in a particular magazine contains a predetermined dose of a substance such as a narcotic material that may be prescribed to a patient. Alternatively, other forms of cylindrically packaged medications or items may be held in the magazines instead of vials. Medicine dispenser 100 optimally houses a large number of magazines, each one holding vials with a particular type of medicine. Each magazine 168 includes a vial dispensing mechanism later described in detail that releases vials in response to electrical signals one at a time from the lower end of the magazine. Released vials are guided on a chute 172 into a pocket 174 in a drawer 176. Drawer 176 may be a simple drawer or in alternative embodiments may be controllably locked and unlocked by an electronic lock 178 shown schematically inside the medicine dispenser. Each magazine has a dispense verification

sensor 179 associated therewith. Sensor 179 is operable to detect the actual dispense of a vial from a magazine. Sensor 179 may be an optical, mechanical or other suitable sensor type.

When medicines are requested at the display terminal 102, the appropriate vials from the magazines 168 are released and fall down the chute into the pocket 174. After the vials have been released and are in position in the pocket, they may be taken. In alternative embodiments in which the drawer is controlled, the data terminal 102, in response to signals from the computer 84 unlocks the electronic lock 178 and enables the drawer 176 to be pulled outwardly so that the vials in the pocket may be taken.

Replenishment of the medicine dispenser 100 is accomplished by manually replenishing the magazines and indicating that fact through the data terminal. To accomplish this the medicine dispenser has to be opened. This is possible only under the most secure of circumstances and through the use of a mechanical locking system comparable to that which is conventionally used to secure narcotics. Normally, two keys are required to open the unit and each key is in the possession of a different person.

The operation of the vial dispensing mechanism is shown in greater detail in Figures 10 through 22. Figure 10 shows the vials 170 in the magazine 168. As shown in Figures 11 through 13 because the magazine is tilted downward the vials tend to roll towards the front of the magazine toward an opening 180. The vial adjacent the opening 180 contacts a guide

182 which is dog-legged in cross section. Guide 182 includes a tapered face 184 which is engaged by the first vial 202 in the magazine. Guide 182 further includes an arm portion 186 that extends longitudinally adjacent the vials. Arm portion 186 has attached adjusting pins 188 which extend through the side walls 190 of the magazine. Adjusting pins 188 extend in angled slots 192 and may be fixed at selected positions therein using nuts mounted on the pins or other suitable locking fasteners.

The movable mounting of the guide 182 enables the magazine to accommodate different diameter vials by moving the guide in the slots 192 to provide sufficient clearance for a vial to pass onto the guide adjacent opening 180 but not so much clearance so that the vial can fall out the opening without the actuation of the gate members as later explained.

As best shown in Figures 14 through 16, a front gate 194 and a back gate 196 are mounted adjacent to opening 180. The front gate and back gate are mounted on a front gate shaft and a back gate shaft 198 and 200 respectively.

As shown in Figure 14 in the inoperative position of the gate members front gate 194 engages the underside of first vial 202 adjacent opening 180. The end of front gate 94 engages vial 202 at a position outward towards opening 180 from a location on the surface of the vial diametrically opposite where vial 202 engages tapered face 184 of guide 182. As a result, the vial 202 is prevented from passing out through opening 180. In this position any force applied to vial 202 (if it could be accessed) would tend to be resisted by compressive

forces making it very difficult for the vial to be manually removed. In the inoperative position of the magazine shown in Figure 14 the back gate 196 has its upper end extending parallel to a bottom wall 204 of the magazine. As a result, in this position the back gate does not interfere with movement of the vials.

In the actuation sequence for dispensing a vial, the back gate rotates in a clockwise direction to the position shown in Figure 15. As it does this the back gate begins to move to a position blocking the vial immediately behind vial 202 in the magazine from moving toward the opening 180. In the position shown in Figure 15 the front gate 194 remains in its original blocking position holding vial 202 in the magazine.

After the back gate has begun to rise as shown in Figure 15, the front gate begins to rotate in a clockwise direction toward the position shown in Figure 16. As the front gate 194 rotates vial 202 is no longer held in the magazine and passes out the opening 180. The back gate having fully rotated as shown in Figure 16, holds the next vial in the magazine from moving until the front gate returns to its original position shown in Figure 14. When this occurs the back gate returns to its original position allowing the vials to roll forward and the next vial is now in the position of vial 202.

In the preferred embodiment of the invention, the slots 192 are oriented such that for any size vial reasonably accommodated in the magazine, the front and back gates are positioned so that the front gate 194 may assume an over-center blocking position in the closed position

and the back gate can move to prevent the dispense of more than one vial at a time. This ensures that with each cycle of the front and back gates only one vial is dispensed.

The actuating mechanism for the front and back gates is shown in Figures 17 through 22. As shown in Figure 17 the actuating mechanism for the gates includes an electrical solenoid 206. Solenoid 206 has an actuating plunger member with a pin 208 extending traversely therefrom. Pin 208 extends traversely in a first slot 210 in a first actuator plate 212 which is attached to the front gate 194. Pin 208 also extends through an opening 214 in a second actuator plate 216 which is attached to back gate 196. As best shown in Figure 18 first actuator plate 212 has a traversely extending finger 218. In the position of the front gate shown in Figures 17 and 18, finger 218 engages a detent 220 in the second actuator plate 216. The purpose of detent 220 is to prevent finger 218 and front gate 212 from moving in a clockwise direction whenever the second actuator plate 216 is in its inoperative position as shown in Figures 17 and 18. This prevents a person who may gain access to the front of the magazine from being able to deflect the front gate so as to cause the vials to be removed from the magazine.

As shown in Figures 19 and 20 the actuation of solenoid 206 by an electrical signal from the data terminal causes pin 208 to move second actuator plate 216 in a clockwise direction. This causes back gate 196 to move upward and detent 220 to disengage from finger 218. As a result, front gate 194 may move only after back gate 196 has risen so as to block the dispense of further vials. Upon further movement of pin 208 by solenoid 206 the front and

back gate move to the positions shown in Figures 21 and 22. In these positions the front gate is rotated so as to release vial 202 while the back gate is extended fully upward so as to prevent the discharge of the next vial in the magazine. Thereafter, discontinuance of the electrical signal to solenoid 206 returns the gate members to their original positions and allows the next vial to assume the position adjacent to the opening from the magazine.

The vial dispensing mechanism of the present invention enables the controlled dispense of one vial at a time from the magazine in response to an electrical signal. This assures that only the requested medication is dispensed. The same magazine may be readily adapted to vials of varying diameter by adjusting the position of guide 182. The magazine also accommodates vials of different lengths. In addition, the gate members are suitably secure so as to avoid tampering by persons who might attempt to gain access to the interior of the medicine dispenser 100 through the dispenser drawer 176.

The vial dispensing mechanism also assures that the requested medical item has been dispensed. This is assured by using signals generated by sensor 179 to minimize the risk that a dispense will be recorded which has not actually occurred due to a malfunction. Circuitry in the dispenser is connected to the sensor 179 and transmits signals when a vial passes out of a magazine. These signals are checked to see if they are generated when a signal to dispense to the corresponding magazine is given. The dispense of any item from a location and the provision of such item to a patient is only recorded in the computer data store when the dispense is verified by the sensor associated with the magazine. Alternatively, in other

embodiments a bar code reader may be installed in the dispenser and bar code applied to the vials to verify not only the dispense but the type of item dispensed.

Although in the above described embodiment of the medicine dispenser the gate members are shown as extending the entire width of the magazine, in other embodiments the gate members may have other configurations and may be of different designs so as to extend only a portion of the width. Although in the preferred form of the invention the magazines extend in downward tilted relation in other embodiments they may be arranged to extend vertically. In such alternative embodiments guides may be provided to hold the vials adjacent to plate 204. Further, the vials may be dispensed in a vertically upward direction through incorporation of spring loading to bias the vials upward in the magazine. A fundamental aspect of the invention is that the gate member which corresponds to the front gate member engages the vial in an over-center position with regard to where the vial contacts the tapered face, and the back gate member moves in synchronized relation with the front gate member to prevent the dispense of more than one vial at a time.

The system for monitoring and dispensing medical items which includes the hook registers, box registers, electronic lock drawer and medicine dispenser previously described may also include or be used with other types of devices. These may include automatic dispensing devices as well as manual devices for which the inventory and use information can be input as a matter of practice at a conveniently located data terminal. The system of the present invention is highly adaptable to accommodate medical facilities of varying size. As the

system of the present invention is also connected to a variety of computers which include data stores, a wide variety of parameters may be monitored and evaluated so as to avoid conditions of waste, fraud and abuse.

Thus the new system for dispensing and monitoring medical items of the present invention achieves the above stated objectives, eliminates difficulties encountered in the use of prior systems, solves problems and attains the desirable results described herein.

In the foregoing description certain terms have been used for brevity, clarity and understanding. However, no unnecessary limitations are to be implied therefrom because such terms are for descriptive purposes and are intended to be broadly construed. Moreover, the descriptions and illustrations given are by way of examples and the invention is not limited to the exact details shown or described. In addition, any feature of the invention that is described in the following claims as a means for performing a function is to be construed to encompass any means capable of performing the function and shall not be limited to the means disclosed in the foregoing description or any mere functional equivalent thereof.

Having described the features, discoveries and principles of the invention, the manner in which it is constructed and utilized, and the advantages and useful results obtained, the new and useful structures, devices, elements, arrangements, parts, combinations, systems, equipment, operations, methods and relationships are set forth in the appended claims.

CLAIMS

We claim:

1. A system for monitoring and dispensing medical items comprising:

a plurality of item storage locations, wherein at least one unit of a type of medical item is positionable in each location;

a sensor adjacent each location wherein said sensor generates an addition signal indicative of addition of a unit of the item at the location and a subtraction signal indicative of a unit of the item being removed from the location;

a counter connected to the sensor whereby said counter counts the signals generated by the sensor wherein the counter holds a count of the units of said items added and subtracted at the location;

at least one processor connected to the counter, said processor connected to at least one data store, wherein said data store includes a total of the type items at said location, and wherein said processor periodically reads said counter and modifies said total in said data store in accordance with the count from said counter.

2. The system according to claim 1 and further comprising a data terminal connected to said counter and said processor, wherein said data terminal includes a patient selection device

and wherein said data store includes a patient record related to said patient and wherein said count of units of said type items is included in said patient record responsive to said patient selection device.

3. The system according to claim 1 and further comprising a data terminal connected to said processor and said counter, wherein said data terminal has an output device for indicating a number of said items to be used, and wherein said data terminal further includes an input device for selecting a medical procedure, and wherein said data store includes a procedure record wherein data representative of a use number of said items in said location to be used during said procedure is stored, and wherein said use number is indicated through said output device responsive to selection of said medical procedure at said data terminal.

4. The system according to claim 1 and further comprising a data terminal connected to said processor and said counter, and wherein said data terminal includes a user identification device whereby a user may identify himself at the data terminal, and wherein said data store includes a user record related to authorized users and wherein said count of units of said type is stored in said data store in association with said user record.

5. The system according to claim 1 wherein said location holding the medical item type is a secure location wherein access thereto is controlled by a lock, and further comprising a data terminal connected to said processor and said lock and wherein said data terminal includes a user identification device wherein said user identification device receives data

identifying a user of the medical item, and wherein said data store includes a user record related to authorized users and wherein said processor is operative to unlock the lock responsive to the user inputting data corresponding to an authorized user record at said data terminal.

6. The system according to claim 5 wherein said user identification device at said data terminal includes a reader for reading a coded object associated with said user.

7. The system according to claim 6 wherein said user identification device at said data terminal further includes a manual input, wherein said manual input is uniquely associated with said coded object and wherein unlocking of said lock is responsive to reading said coded object and receiving the manual input uniquely associated therewith.

8. The system according to claim 5 wherein said processor is not operative to unlock said lock unless data corresponding to at least two (2) authorized user records is input at said data terminal.

9. The system according to claim 1 and further comprising a data terminal connected to said processor and said counter, and wherein said data terminal includes an input device and wherein said input device is selectively operable to indicate the addition of inventory at said location.

10. The system according to claim 1 wherein said data store includes identifying indicia associated with the medical item in said location.

11. The system according to claim 1 wherein said data store further includes a lower limit for the number of units of said medical item and wherein said system further comprises an indicator for indicating when said total reaches said limit.

12. The system according to claim 11 wherein an administrator terminal comprises said indicator.

13. The system according to claim 1 wherein said data store includes a location record associated with each said location, said location record including said total, and wherein said location record includes data representative of at least one characteristic of said item type in said location.

14. The system according to claim 13 and further comprising an administrator terminal including an administrator input device, said administrator terminal connected to said data store, and wherein said data representative of said characteristic of said item type is input to said location record through said administrator terminal.

15. The system according to claim 1 and further comprising a location identification indicator uniquely associated with each said counter, wherein said location identifying indicator is read in conjunction with said counter by said processor.

16. The system according to claim 1 and further comprising a data terminal connected to said processor and said counter, and wherein said data terminal includes an input device wherein a user inputs identifying data associated with a physician, and wherein said data store includes a physician record associated with said physician and wherein said count is stored in said data store in association with said physician record.

17. The system according to claim 1 wherein said data store includes a physician record including data representative of preferred operating room conditions for said physician, and wherein said system further comprises a data terminal connected to said processor and including an input device wherein a user inputs physician identifying data associated with said physician, said data terminal further including an output device wherein said output device outputs the physician's preferred operating room conditions responsive to input of said physician identifying data.

18. The system according to claim 17 wherein said physician record includes data representative of musical preferences of said physician.

19. The system according to claim 11 and further comprising means for issuing an acquisition request to a source of said medical item responsive to said indicator.

20. The system according to claim 1 and further comprising a timer in connection with said counter, wherein said timer holds time indicia in association with said count.

21. A system for monitoring and dispensing medical items comprising:

a plurality of storage locations wherein at least one unit of a type of medical item is positionable in each location prior to use;

a sensor adjacent each location wherein said sensor generates a signal indicative of removal of a unit of the item at said location;

a data terminal operatively connected to said sensor, said data terminal including a data entry device whereby a user inputs data identifying a patient receiving said medical item proximate in time to removal of said item from said location;

at least one processor operatively connected to said data terminal, said processor operatively connected to at least one data store, said data store including a patient record associated with the patient and a location record associated with each storage location, the location record including data representative of the respective type of

medical item in each location, and wherein upon removal of the item type from a location by a user data representative of use of the type medical item for the patient is included in the patient record.

22. A system for monitoring and dispensing medical items comprising:

a plurality of storage locations, wherein at least one unit of a type of medical item is positionable in each location prior to use;

a dispenser mechanism for selectively dispensing items from a storage location responsive to electrical signals;

a data terminal operatively connected to the dispenser mechanism, the data terminal including a data entry device whereby a user inputs data identifying a patient receiving said medical item proximate to dispense of said item by said dispenser mechanism;

at least one processor operatively connected to said data terminal, said processor operatively connected to at least one data store, said data store including a patient record associated with the patient and a location record associated with at least one storage location in the dispenser mechanism, the location record including the respective type of medical item in each location, and wherein upon dispense of an

item from a location use of the type medical item for the patient is included in the patient record.

23. The system according to claim 22 wherein said data store further includes a plurality of authorized user records and wherein said data terminal further includes a user data entry device wherein the user inputs user identification data, and wherein said processor enables operation of said dispenser only when said user identification data corresponds to an authorized user record in said data store.

24. The system according to claim 23 wherein data indicative of the type of item dispensed by said user is stored in association with said user record in said data store.

25. The system according to claim 23 wherein said processor enables operation of said dispenser only if at least two (2) authorized users have input their respective user identification data at said data terminal.

26. The system according to claim 23 wherein said user identification data includes both data encoded on an object and data input manually by the user, said manually input data having a unique relationship with the data encoded on the object.

27. The system according to claim 21 wherein said data store further includes a total of units associated with each location record and wherein said total is reduced by a number of units removed from the location.

28. The system according to claim 27 wherein said system further comprises an indicator, and wherein an indication is given by said indicator when said total of units in the location reaches a lower limit.

29. The system according to claim 27 and further comprising a counter connected to each sensor, and wherein said counter holds a count of units added to or subtracted from said location, and wherein said system reads said count periodically and updates the respective total for said location in said data store.

30. The system according to claim 29 wherein each said counter has associated therewith the location identifying indicator uniquely associated with said counter wherein said count in said counter is read in conjunction with said location identifying indicator by said processor.

31. The system according to claim 30 wherein said counter and location identifying indicator are connected to and are periodically read by said processor.

32. The system according to claim 21 wherein said data store includes at least one procedure record, said procedure record including types of medical items used in a medical

procedure, and wherein said data terminal includes a procedure selection device and an output device wherein upon selection of said procedure at said data terminal said output device indicates types of medical items to be used in the procedure.

33. The system according to claim 22 and further comprising a verification sensor associated with said dispenser mechanism, wherein said verification sensor senses that said medical item has been dispensed from said storage location and wherein said verification sensor is connected to said data terminal and said delivery of said medical item for said patient is included in said patient record only when said verification sensor senses that said medical item has been dispensed.

34. The system according to claim 21 wherein said unit of said medical item has machine readable identifying indicia thereon, and wherein said sensor reads said indicia, and wherein said data store includes an item record associated with said indicia, and wherein upon removal of said item type from a location by user, said processor determines if said indicia read from said item taken corresponds with the data representative of the medical item stored in the location record.

35. A system for monitoring and dispensing medical items comprising:

a plurality of storage locations wherein at least one unit of an item type is positionable in each location prior to use, each said item including thereon a machine readable indicia representative of the type of item;

a sensor adjacent a location for reading said machine readable indiçia on said items and for generating signals representative thereof, and wherein said signals are generated responsive to removal of said item from said location;

at least one processor operatively connected to said sensor, said processor operatively connected to at least one data store, said data store including at least one patient record associated with a patient, and at least one item type record associated with said signals representative of said indicia;

a data terminal operatively connected to said processor, said data terminal including a data entry device whereby a user inputs data identifying said patient, and wherein upon input of said patient identification data and responsive to said signals from said sensor, said processor records use of said item type in said patient record.

36. The system according to claim 35 wherein said machine readable indicia is bar coding.

37. A system for monitoring and dispensing medical items comprising:

a plurality of storage locations wherein at least one unit of a medical item type is positionable in each location prior to use, and wherein each said item type has machine readable indicia thereon representative of the item type;

a reader adjacent to at least one location wherein said reader is operative to read said indicia on said item type and to generate signals representative thereof when said item type is placed in said location;

at least one processor operatively connected to said reader and to at least one data store, said data store including at least one item type record associated with said indicia on said item type, and at least one location record associated with one of said storage locations, and wherein said processor is operative responsive to receipt of said signals from said reader to include said item type in association with said location record, said data store further including at least one patient record associated with a patient;

a patient identification input device in operative connection with said processor, whereby a user may identify said patient;

an indicator operatively connected to said processor, wherein said indicator generates indicator signals responsive to removal of a unit of said item type from said location, wherein said processor is operative to include use of said item type included in

association with said location record in said patient record responsive to identification of said patient at said patient identification input device and said indicator signals.

ABSTRACT

A system for monitoring and dispensing medical items includes a plurality of hook registers (10). Each of the hook registers includes sensors (48, 60, 62, 64) sensing the removal or addition of a medical item to the storage location on the hook register. Each hook register has a microprocessor (66) connected to the sensor which stores a count of the items added or removed from the location. The microprocessor also includes location identifying information specifically associated with the particular hook register. The microprocessor is periodically polled by a controller (72) which reads and stores the count and location identifying information from each of the hook registers. The controller information is periodically read by a data terminal (76) which is connected through a local area network (82) to a remote computer (84) having a processor and data store. A user of the data terminal is enabled to specify a patient for whom medical items will be used when the items are removed from the hook registers or other storage locations. In addition, the system also monitors inventories of items and levels of usage by users. The system also monitors and controls the dispense of other medical items from box registers (110) as well as controls the dispense of items from secure storage locations such as electronic lock drawers (96) and medicine dispensers (100).

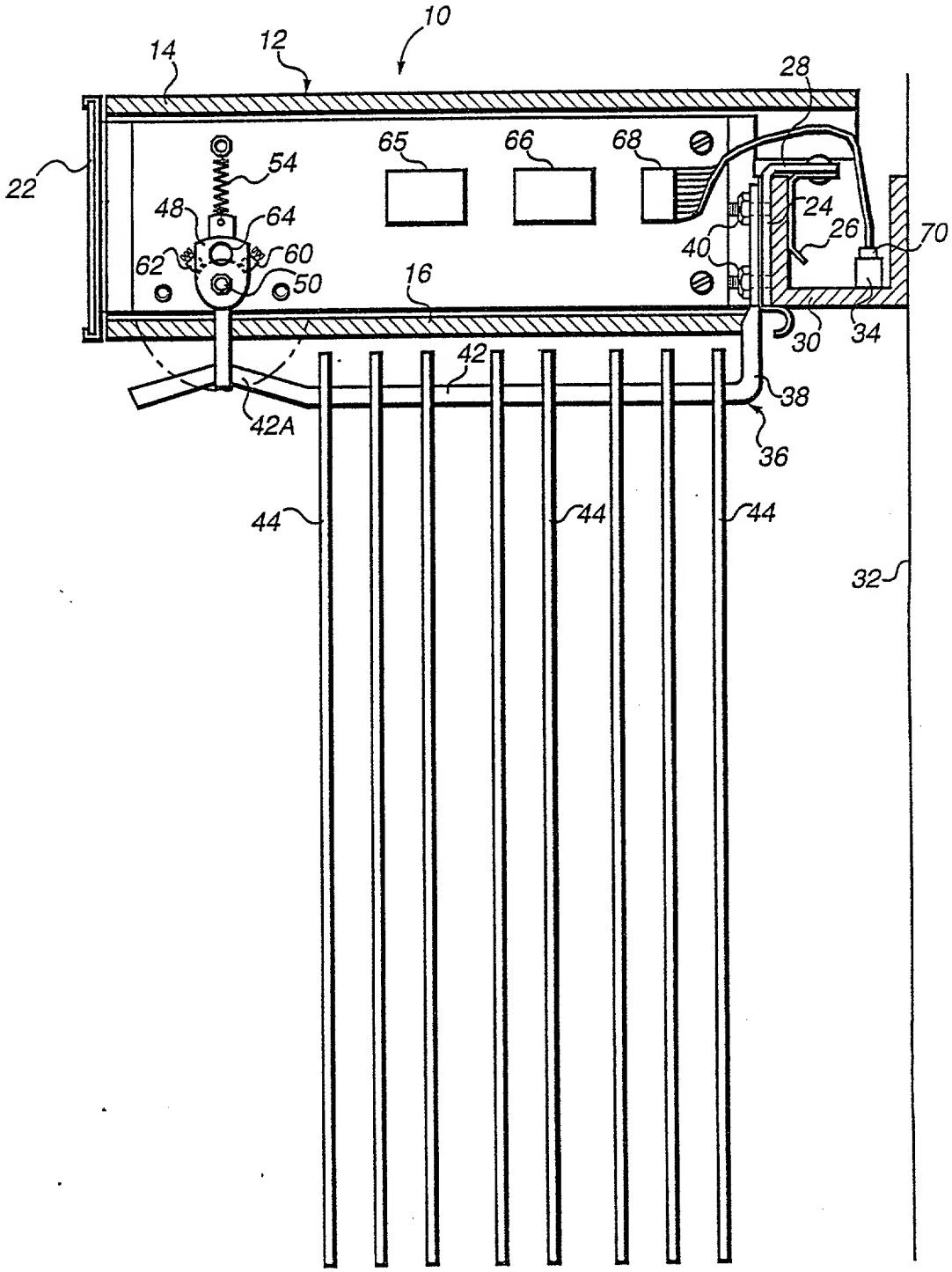
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FIG. 1

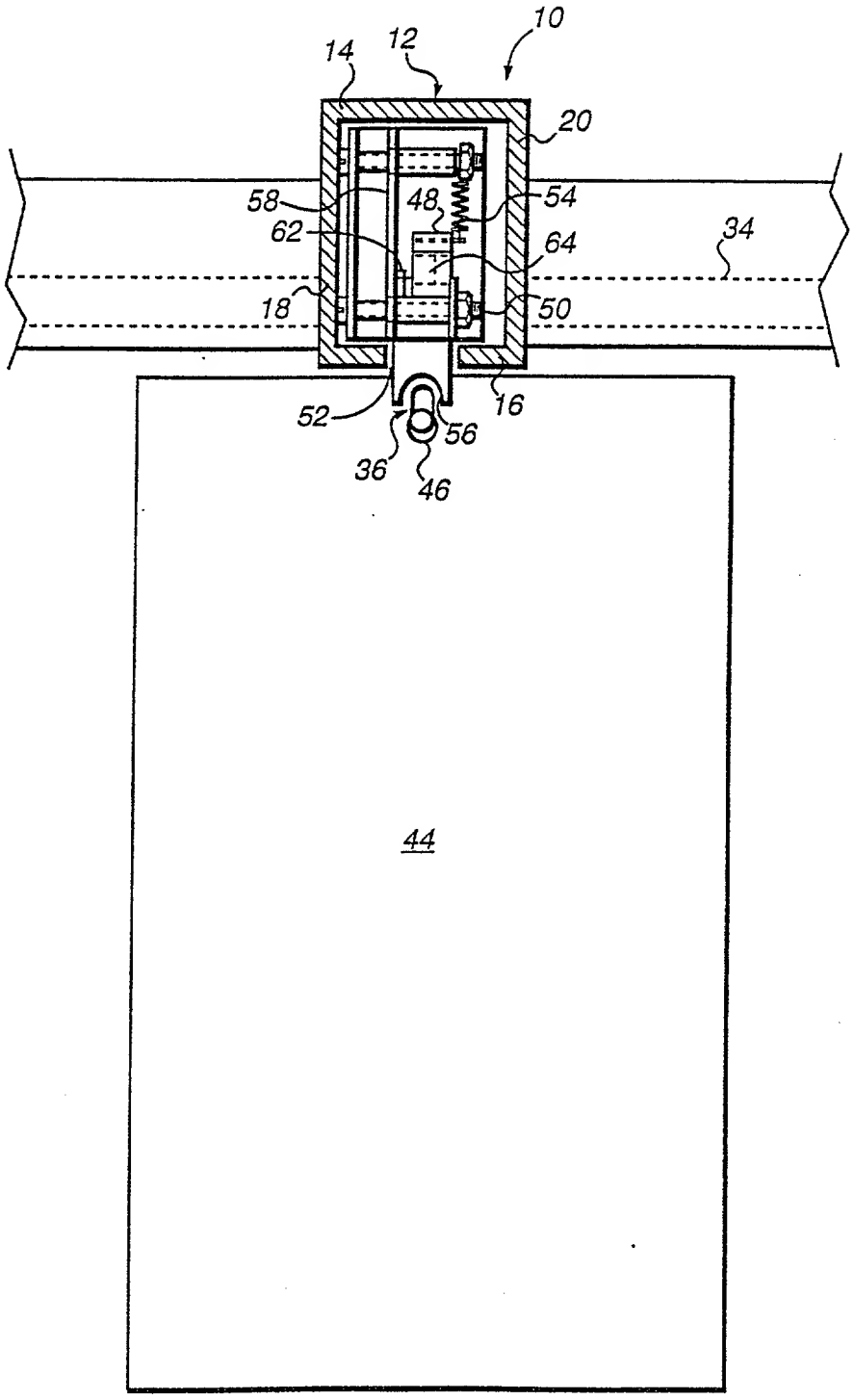

FIG. 2

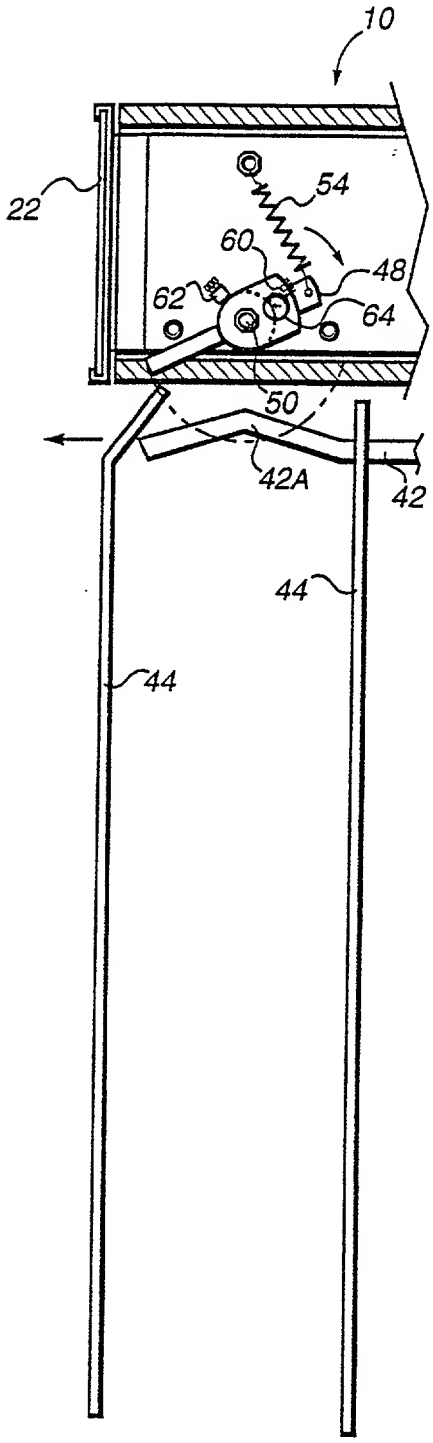

FIG. 3

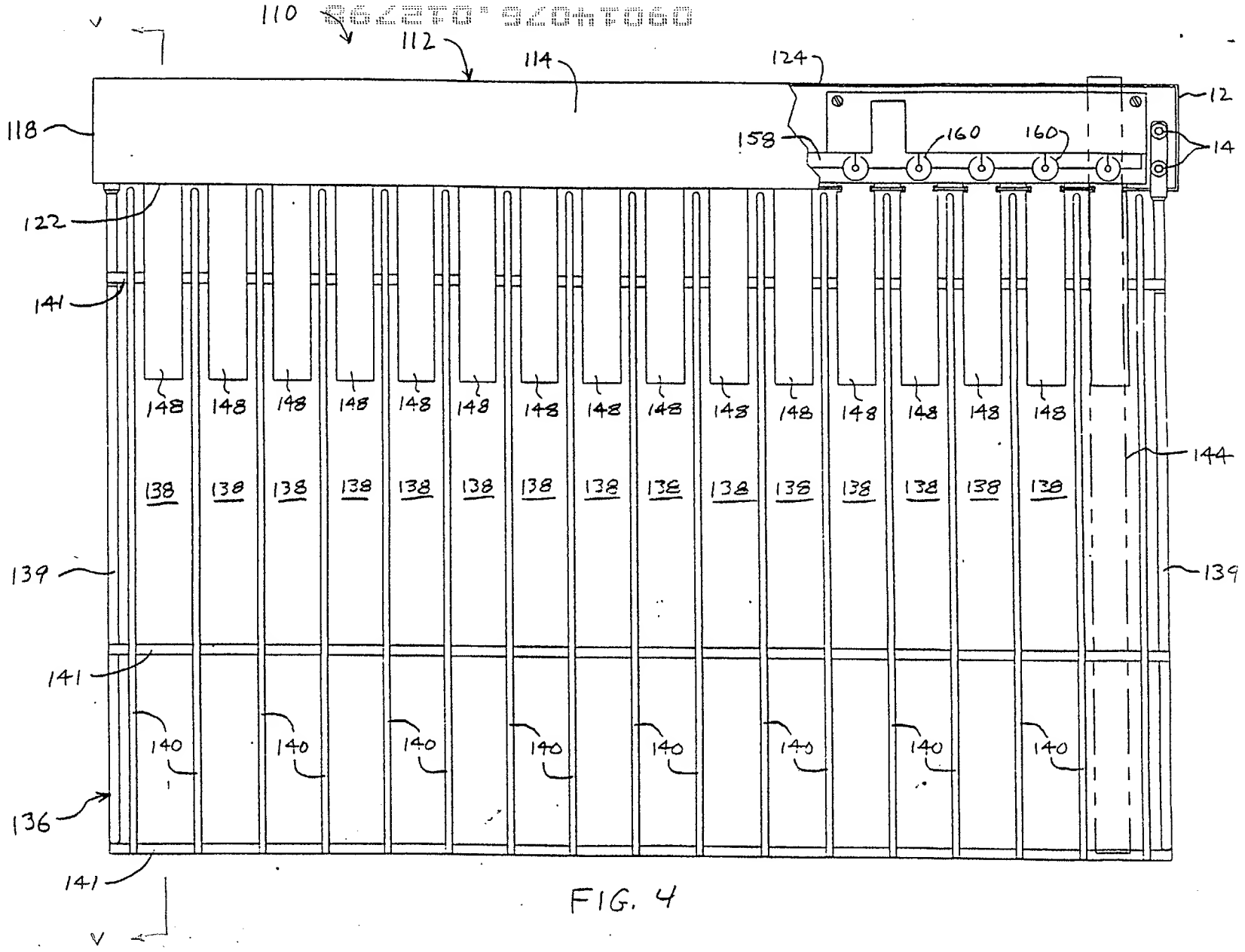
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FIG. 4

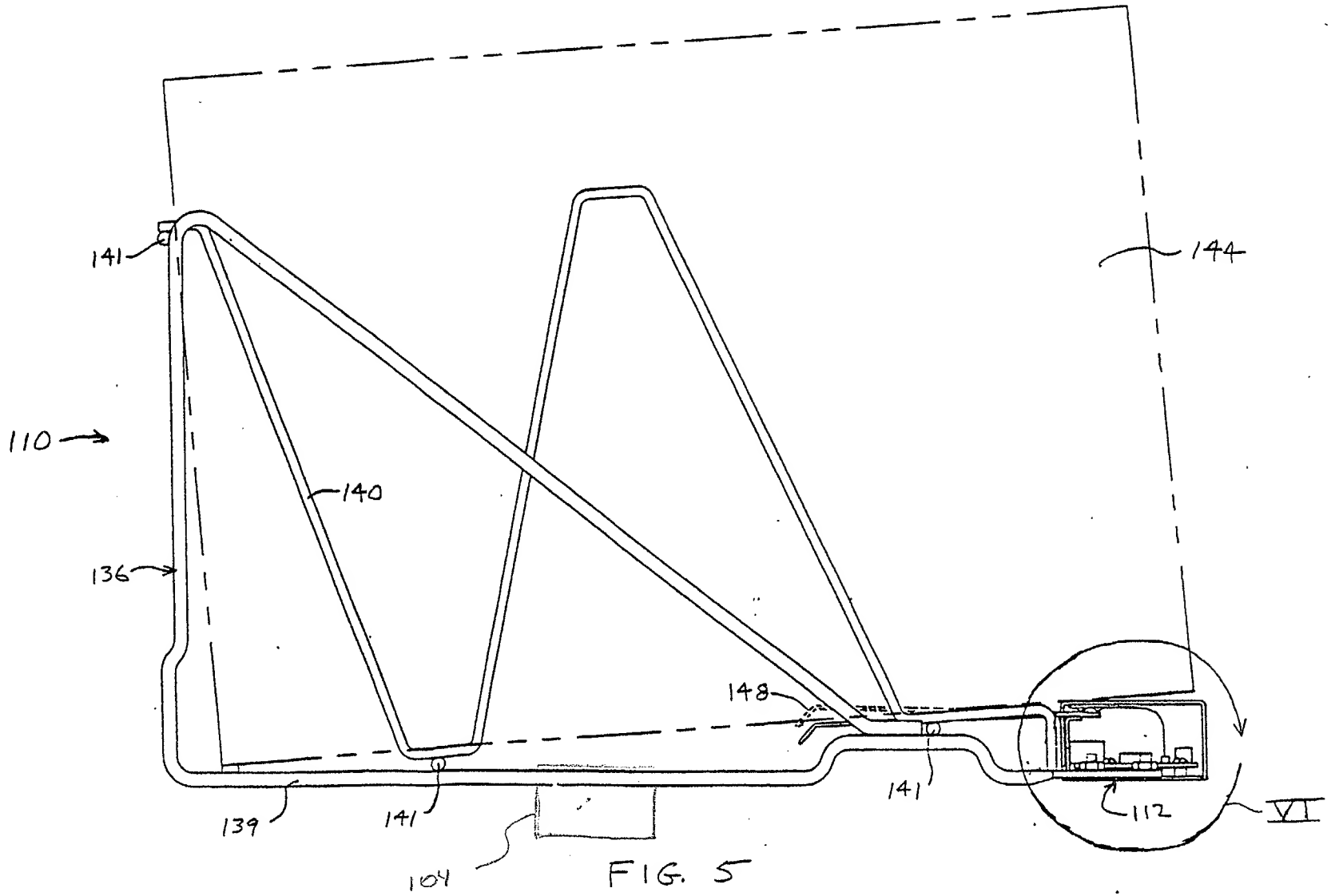


FIG. 5

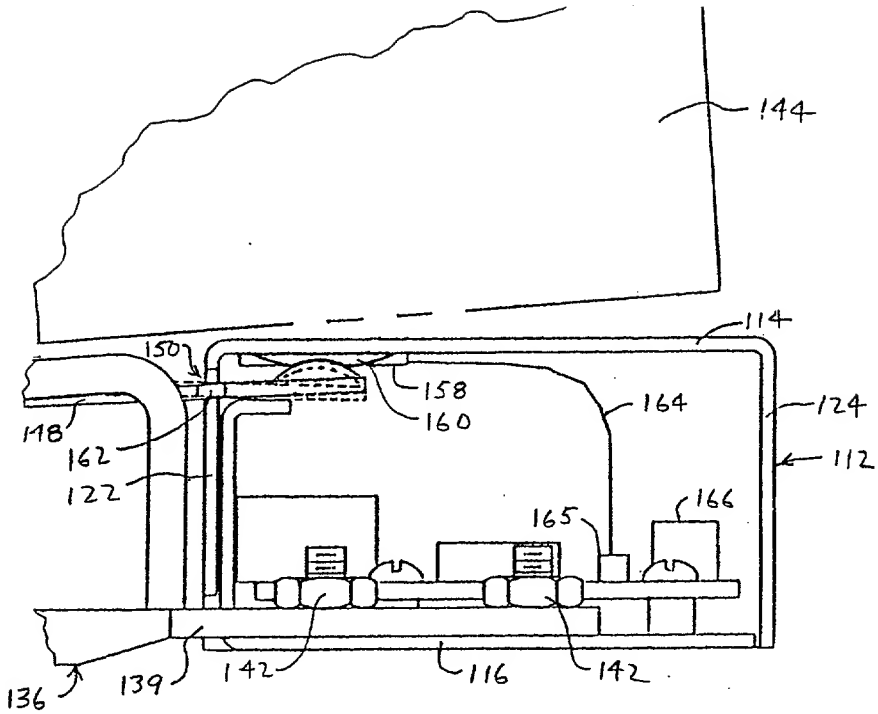


FIG. 6

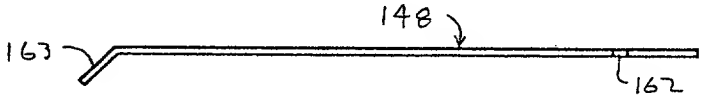


FIG. 7

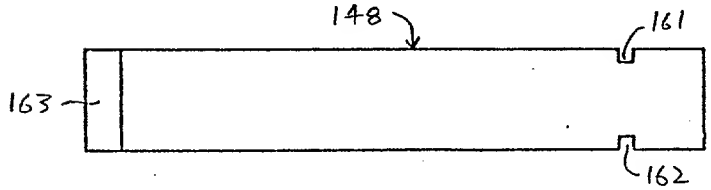
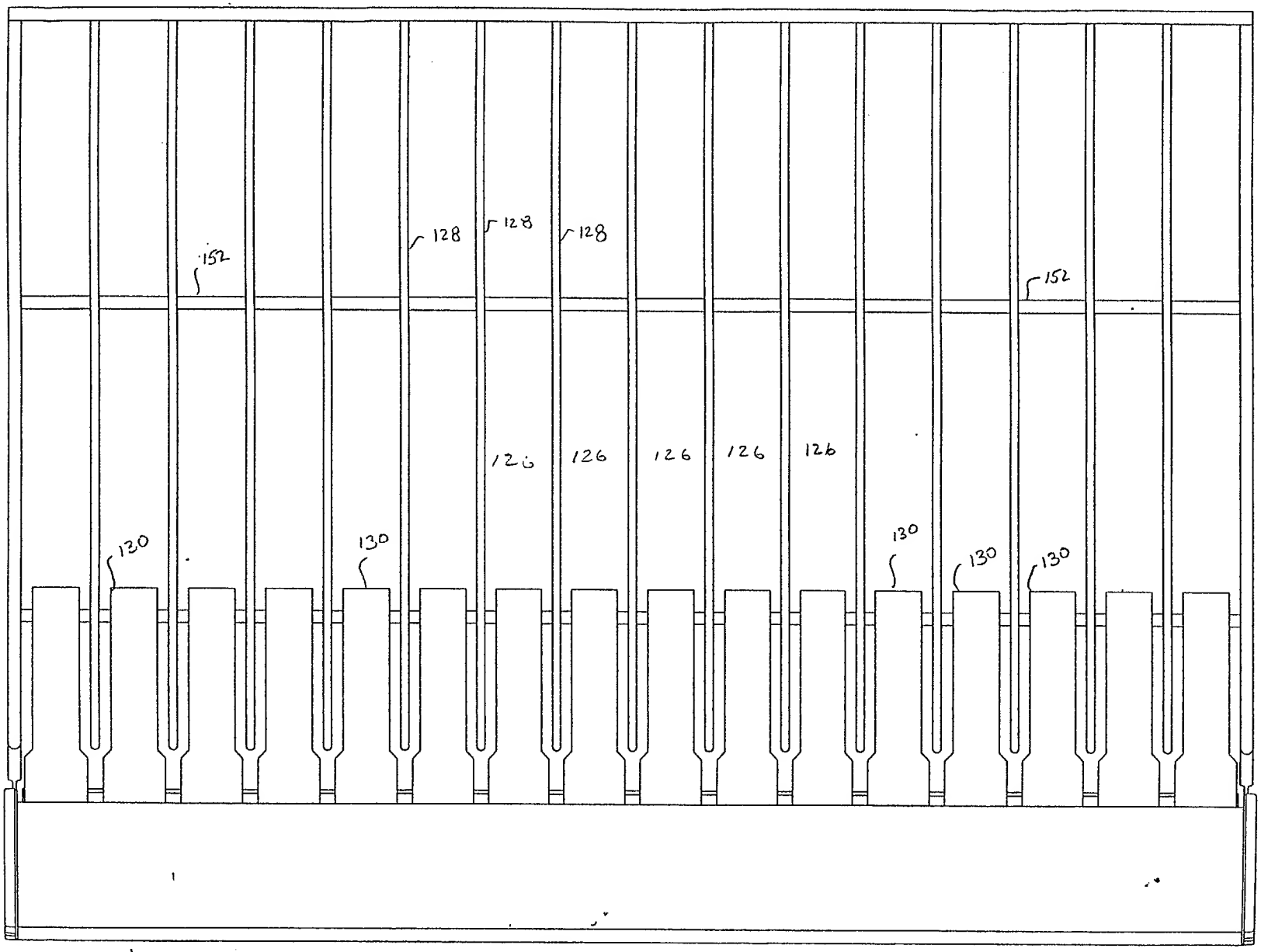


FIG. 8

FIG 9



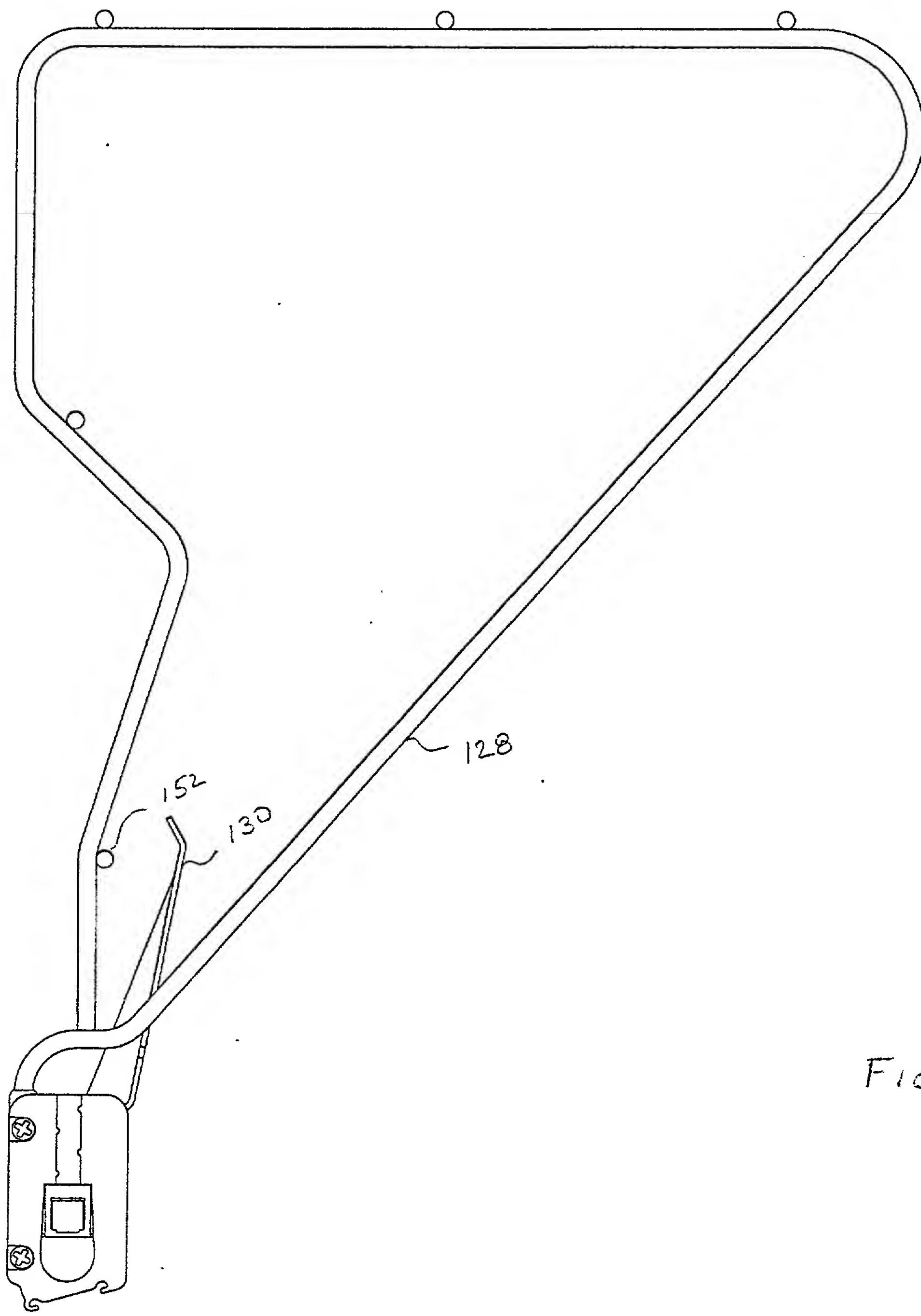


FIG 10

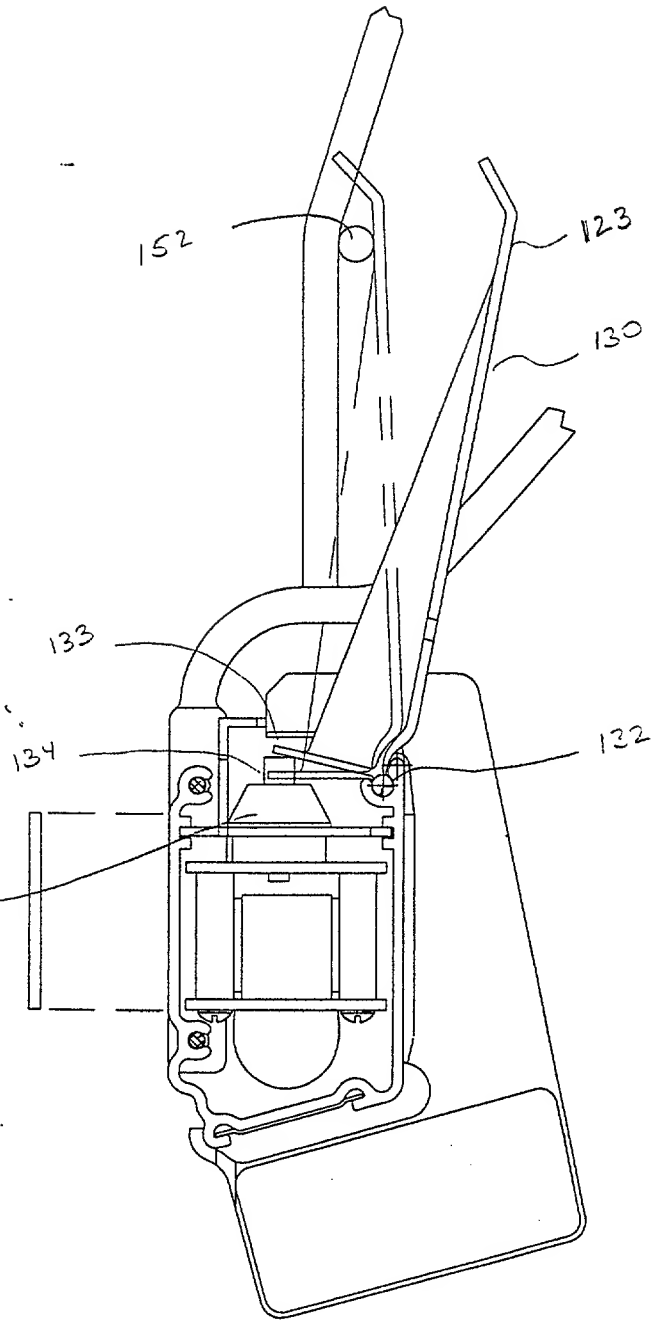


FIG 11

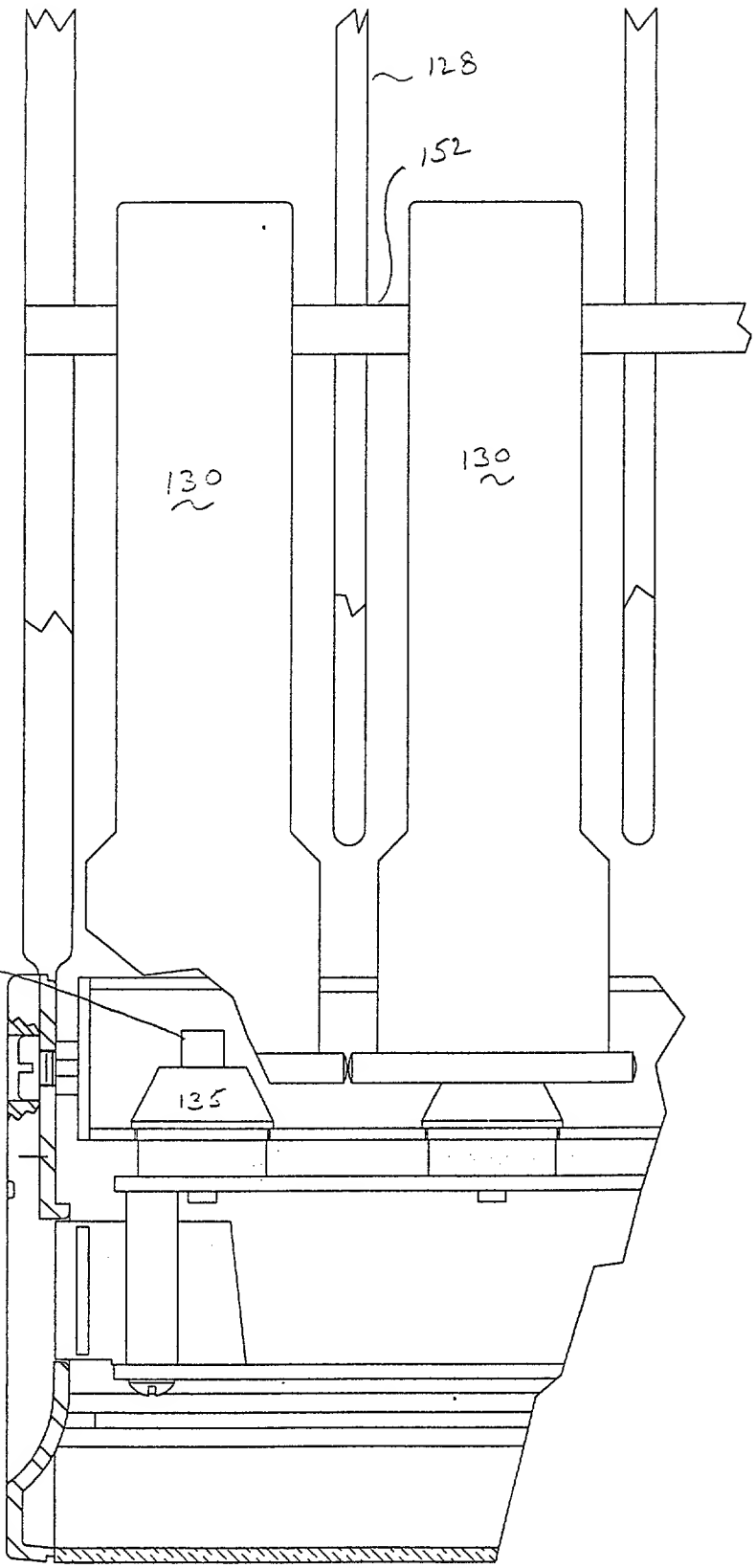


FIG 12

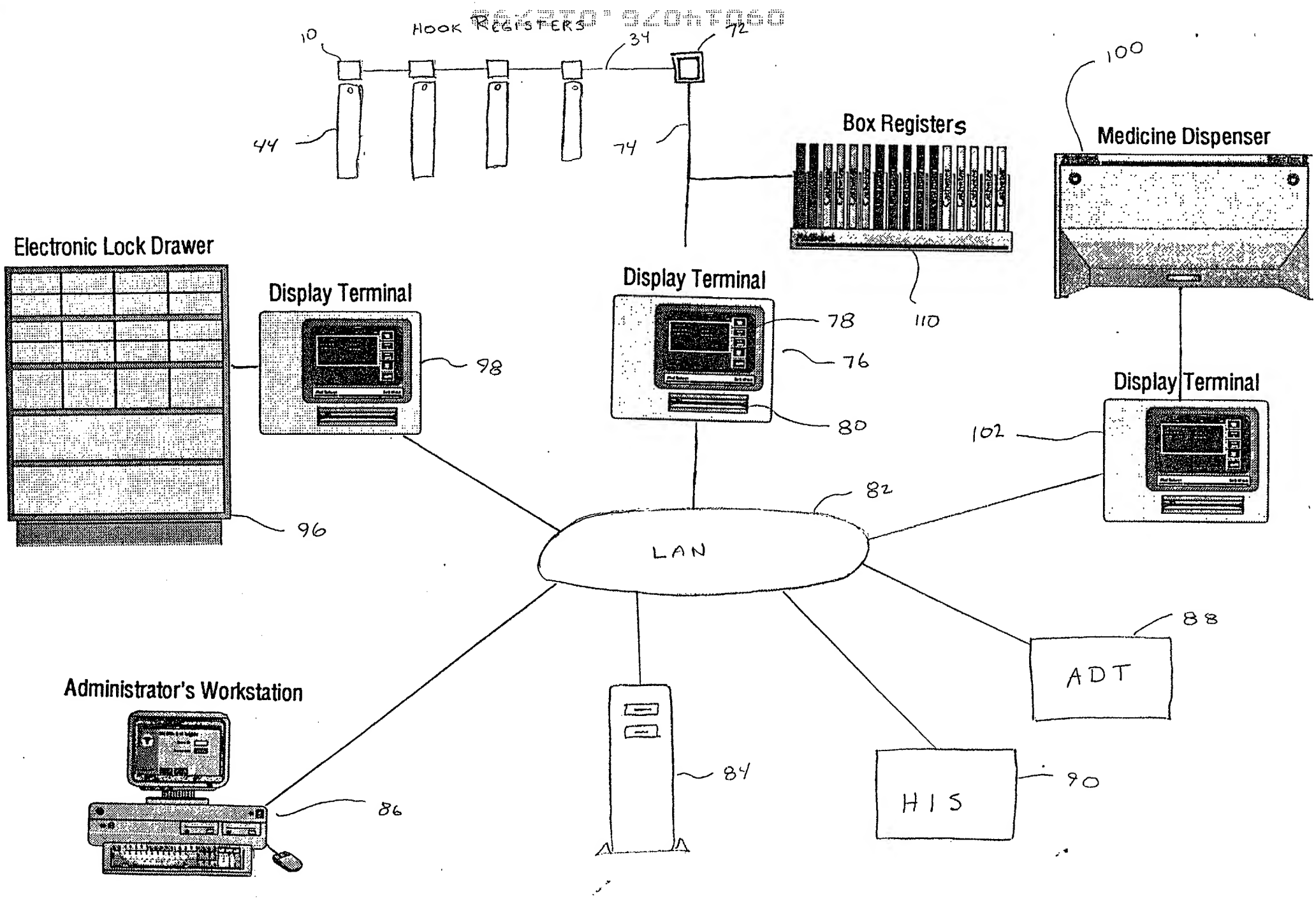
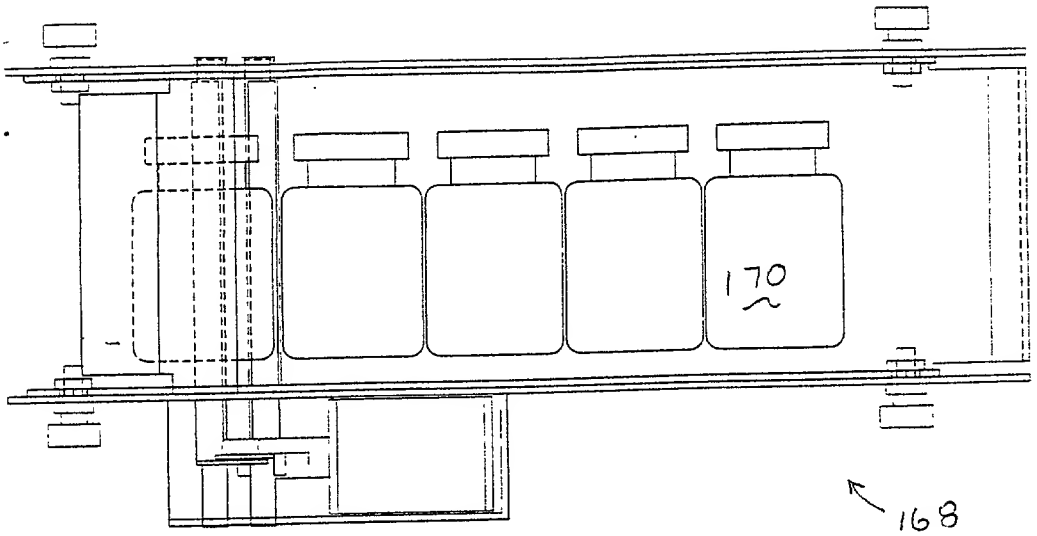
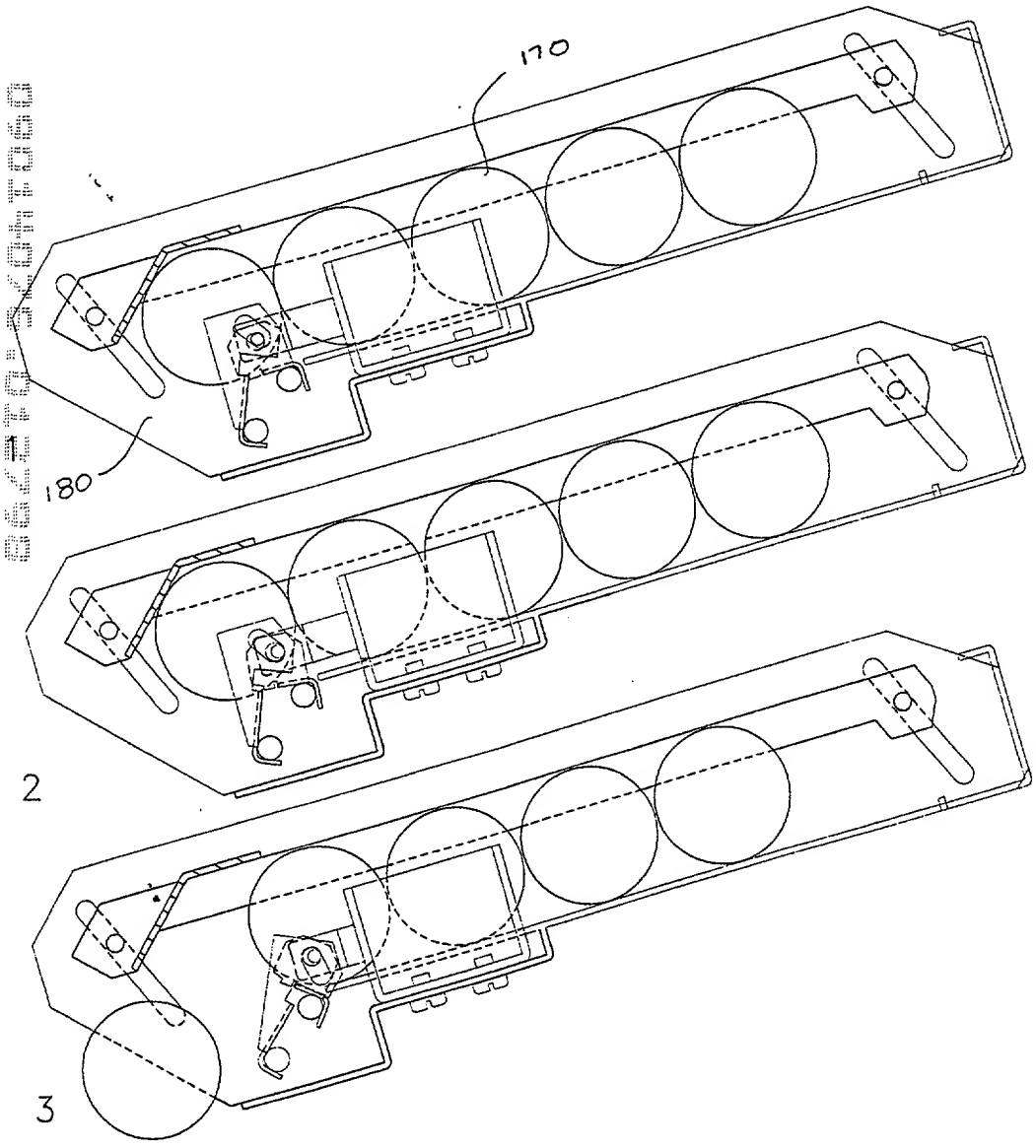

Hook Registers
10
34
72
44
74
Box Registers
100
Medicine Dispenser
Electronic Lock Drawer
Display Terminal
98
Display Terminal
78
76
80
110
Display Terminal
102
82
LAN
96
88
ADT
Administrator's Workstation
86
84
HIS
90

Fig 13



Top View

FIG 14



Side View

FIG 15

FIG 16

FIG 17

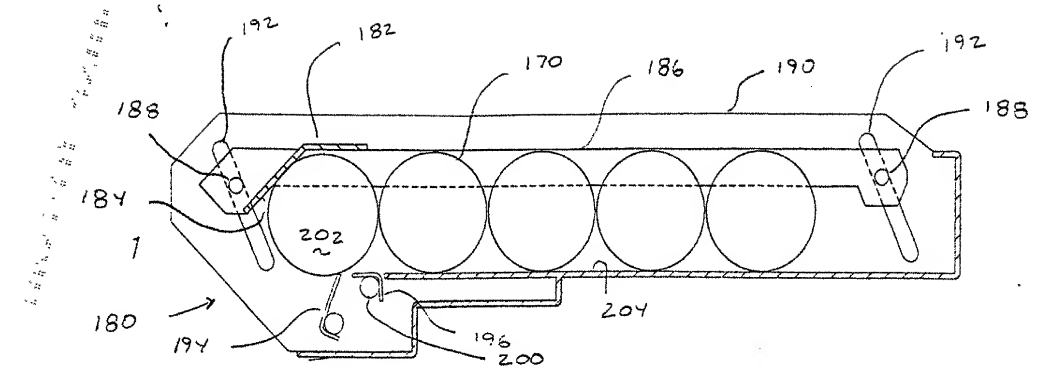


Fig 18

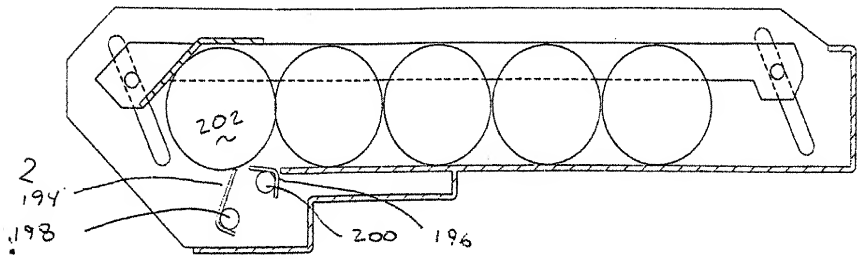


Fig 19

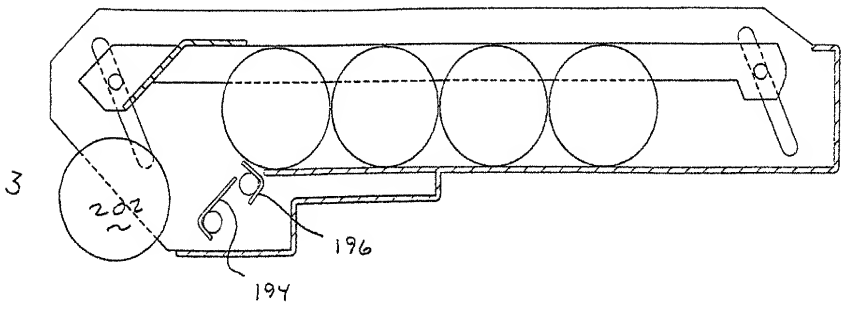


Fig 20

Side View

Fig 21

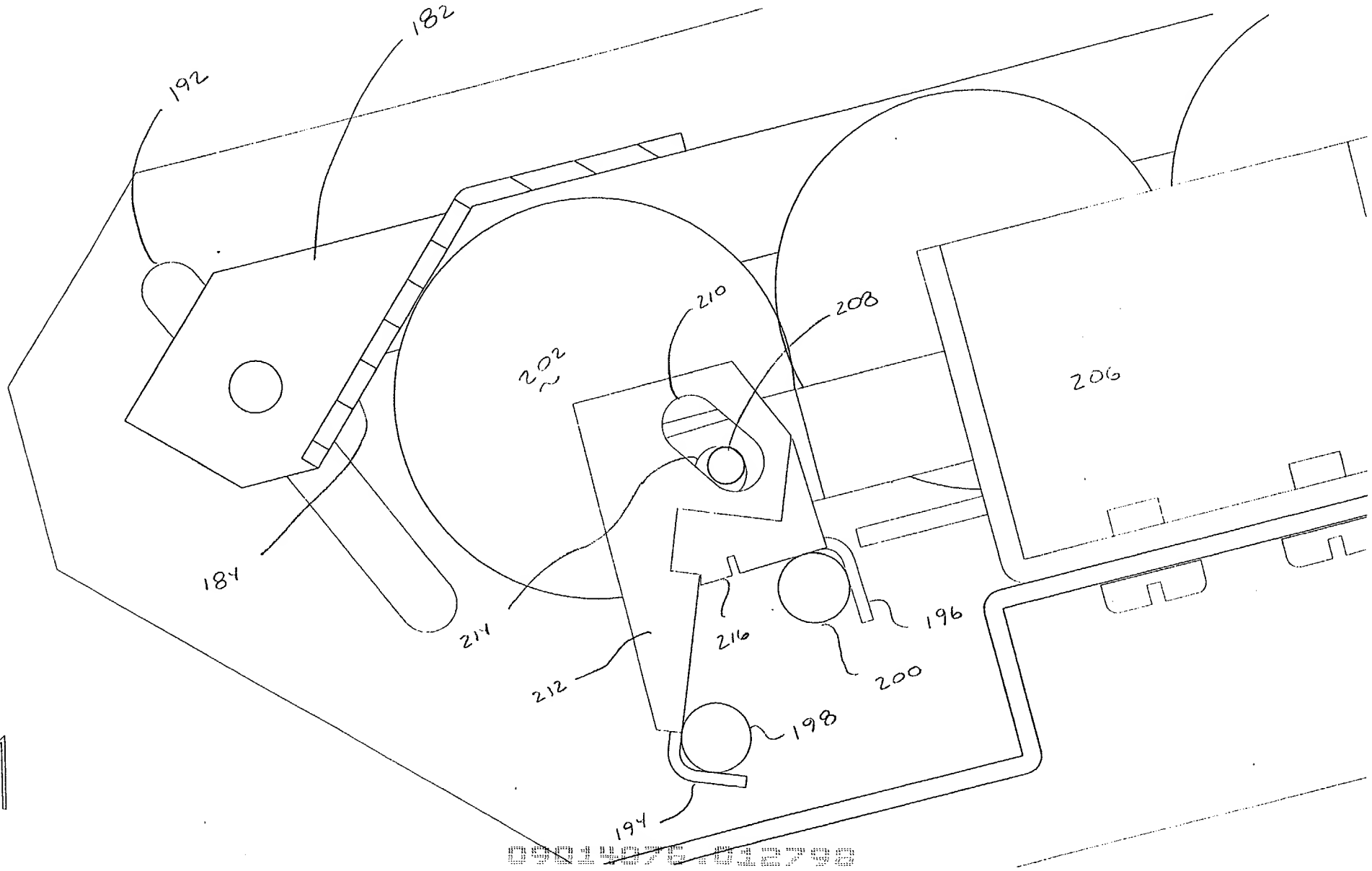
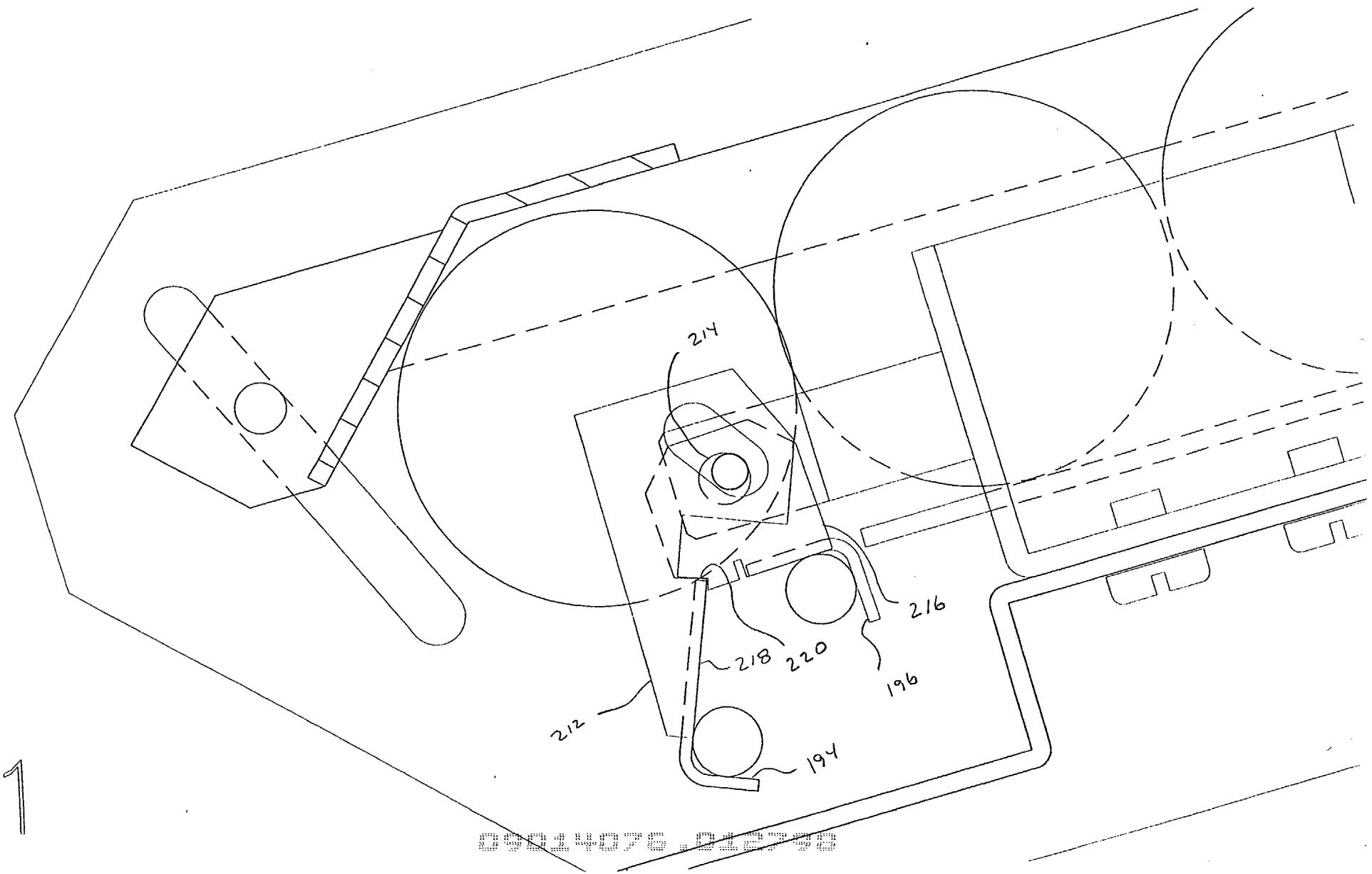
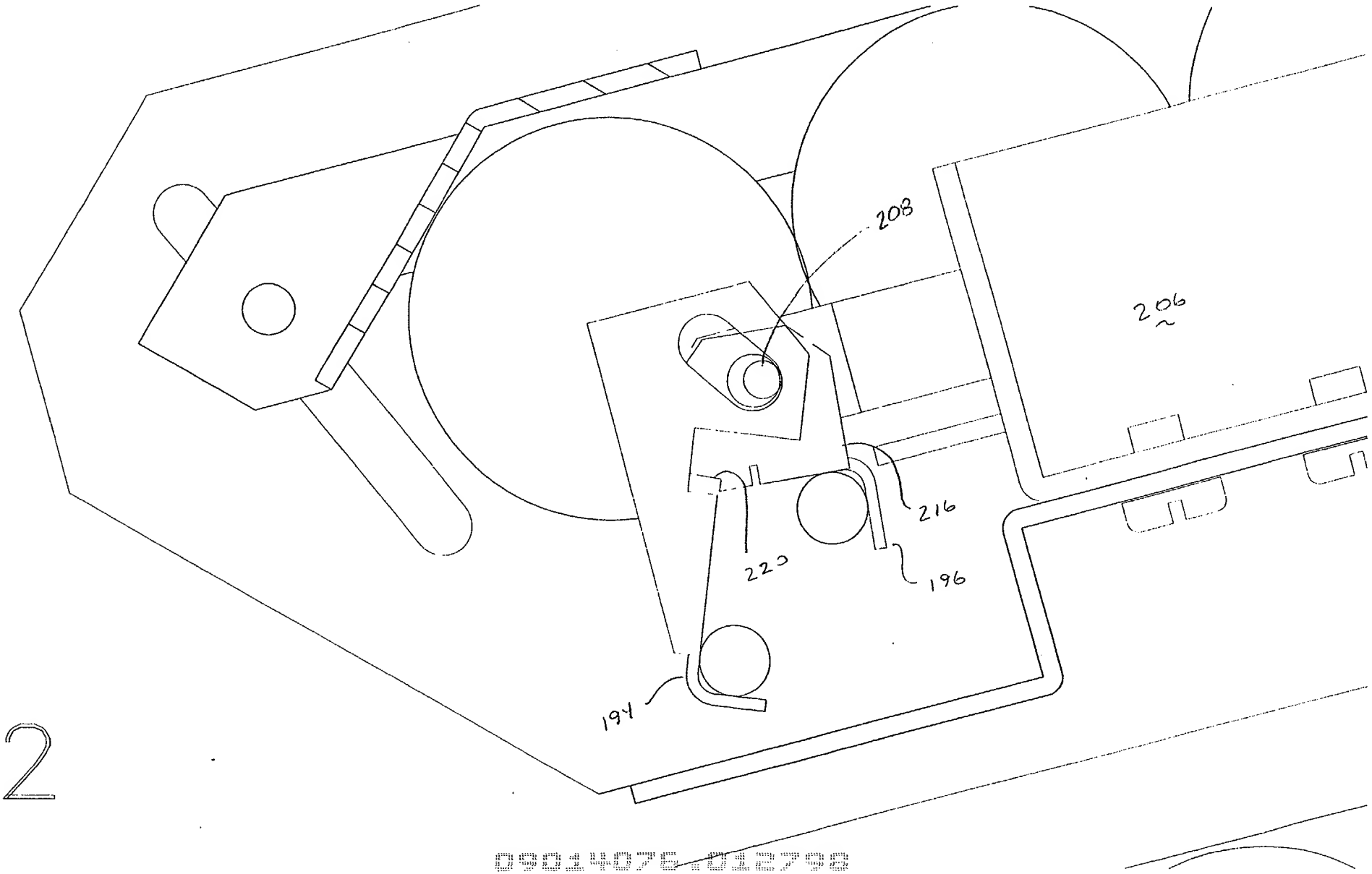


Fig 22



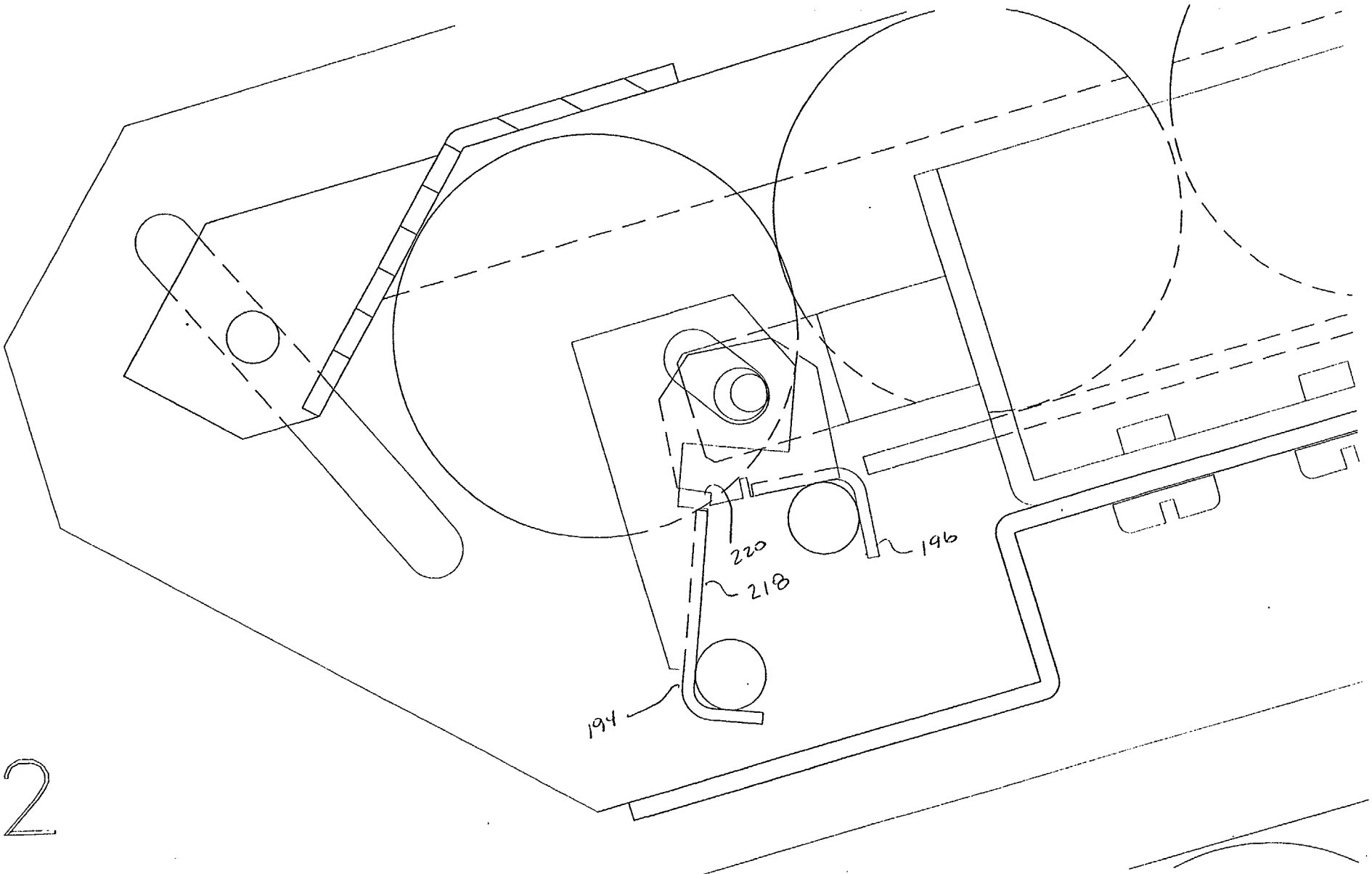
1

Fig 23.



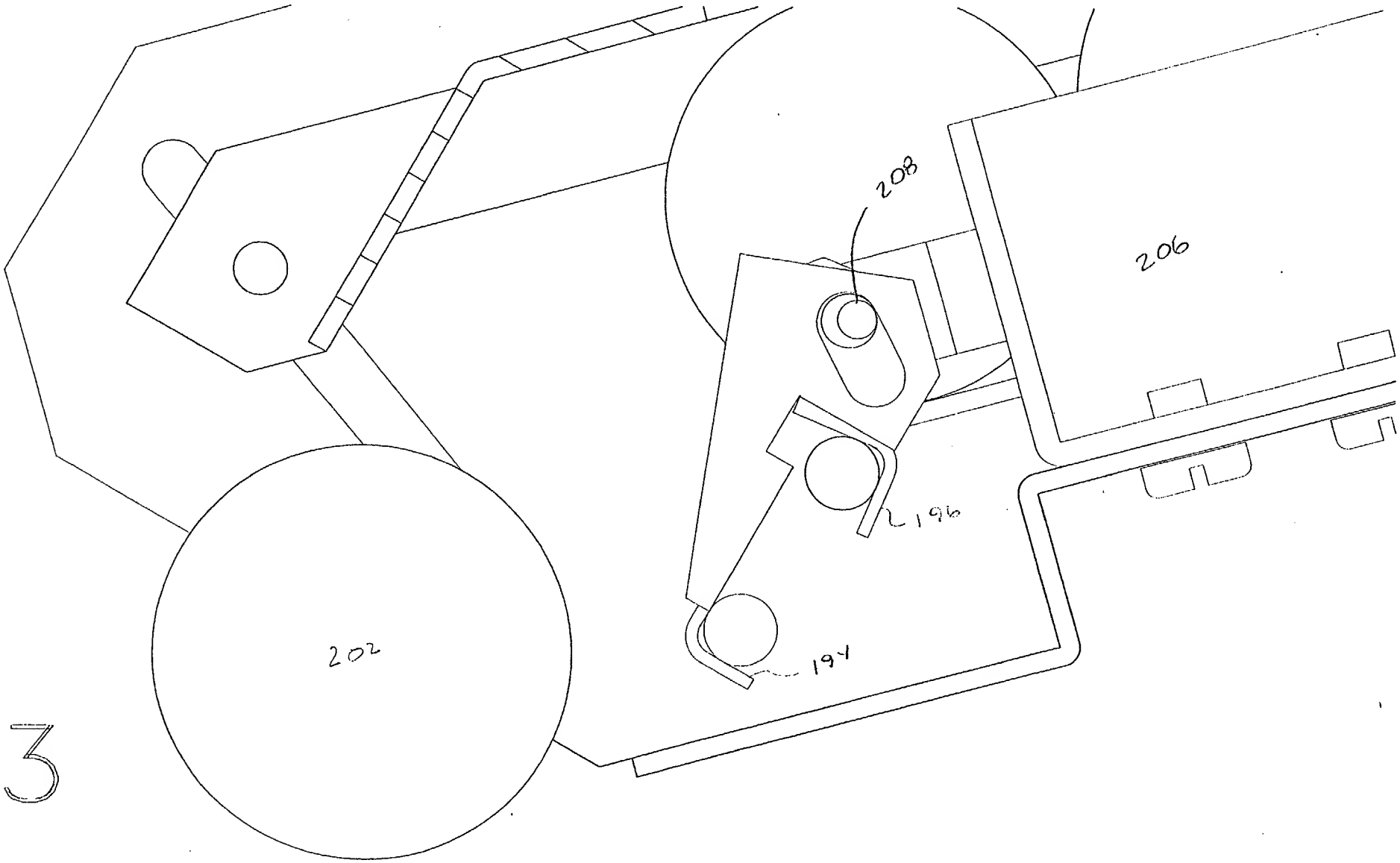
2

Fig 24



2

FIG 25



3

Fig 26

Fig 27

Attorney's Docket No. D-1056 **PATENT**

COMBINED DECLARATION AND POWER OF ATTORNEY

(ORIGINAL, DESIGN, NATIONAL STAGE OF PCT, SUPPLEMENTAL, DIVISIONAL, CONTINUATION OR C-I-P)

As a below named inventor, I hereby declare that:

TYPE OF DECLARATION

This declaration is of the following type: (*check one applicable item below*)

- ☒ original
- ☐ design
- ☐ supplemental

NOTE: *If the declaration is for an International Application being filed as a divisional, continuation or continuation-in-part application, do not check next item; check appropriate one of last three items.*

- ☐ national stage of PCT

NOTE: *If one of the following 3 items apply, then complete and also attach ADDED PAGES FOR DIVISIONAL, CONTINUATION OR C-I-P.*

- ☐ divisional
- ☐ continuation
- ☒ continuation-in-part (C-I-P)

INVENTORSHIP IDENTIFICATION

WARNING: *If the inventors are each not the inventors of all the claims, an explanation of the facts, including the ownership of all the claims at the time the last claimed invention was made, should be submitted.*

My residence, post office address and citizenship are as stated below next to my name. I believe I am the original, first and sole inventor (if only one name is listed below) or an original, first and joint inventor (if plural names are listed below) of the subject matter which is claimed and for which a patent is sought on the invention entitled:

TITLE OF INVENTION

Inventory Monitoring and Dispensing System for Medical Items

SPECIFICATION IDENTIFICATION

the specification of which: *(complete (a), (b) or (c))*

(a) ☒ is attached hereto.

(b) ☐ was filed on _____ as ☐ Serial No. 0 /_____
or ☐ Express Mail No., *as Serial No. not yet known* _____
and was amended on _____ (*if applicable*).

NOTE: *Amendments filed after the original papers are deposited with the PTO which contain new matter are not accorded a filing date by being referred to in the declaration. Accordingly, the amendments involved are those filed with the application papers or, in the case of a supplemental declaration, are those amendments claiming matter not encompassed in the original statement of invention or claims. See 37 CFR 1.67.*

(c) ☐ was described and claimed in PCT International Application No. _____ filed on _____ and as amended under PCT Article 19 on _____ (*if any*).

ACKNOWLEDGEMENT OF REVIEW OF PAPERS AND DUTY OF CANDOR

I hereby state that I have reviewed and understand the contents of the above identified specification, including the claims, as amended by any amendment referred to above.

I acknowledge the duty to disclose information

☒ which is material to patentability as defined in 37, Code of Federal Regulations, § 1.56

(also check the following items, if desired)

☒ and which is material to the examination of this application, namely, information where there is a substantial likelihood that a reasonable examiner would consider it important in deciding whether to allow the application to issue as a patent, and

☒ In compliance with this duty there is attached an information disclosure statement in accordance with 37 CFR 1.98.

PRIORITY CLAIM (35 U.S.C. § 119)

I hereby claim foreign priority benefits under Title 35, United States Code, § 119 of any foreign application(s) for patent or inventor's certificate or of any PCT international application(s) designating at least one country other than the United States of America listed below and have also identified below any foreign application(s) for patent or inventor's certificate or any PCT international application(s) designating at least one country other than the United States of America filed by me on the same subject matter having a filing date before that of the application(s) of which priority is claimed.

(complete (d) or (e))

(d) ☒ no such applications have been filed.

(e) ☐ such applications have been filed as follows.

NOTE: *Where item (c) is entered above and the International Application which designated the U.S. itself claimed priority check item (e), enter the details below and make the priority claim.*

A. PRIOR FOREIGN/PCT APPLICATION(S) FILED WITHIN 12 MONTHS (6 MONTHS FOR DESIGN) PRIOR TO THIS APPLICATION AND ANY PRIORITY CLAIMS UNDER 35 U.S.C. § 119

COUNTRY (OR INDICATE IF PCT)	APPLICATION NUMBER	DATE OF FILING (day, **month**, year)	PRIORITY CLAIMED UNDER 37 USC 119
			☐ YES NO ☐
			☐ YES NO ☐
			☐ YES NO ☐
			☐ YES NO ☐
			☐ YES NO ☐

ALL FOREIGN APPLICATION(S), IF ANY FILED MORE THAN 12 MONTHS (6 MONTHS FOR DESIGN) PRIOR TO THIS U.S. APPLICATION

NOTE: *If the application filed more than 12 months from the filing date of this application is a PCT filing forming the basis for this application entering the United States as (1) the national stage, or (2) a continuation, divisional, or continuation-in-part, then also complete ADDED PAGES TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR C-I-P APPLICATION for benefit of the prior U.S. or PCT application(s) under 35 U.S.C. § 120.*

POWER OF ATTORNEY

I hereby appoint the following attorney(s) and/or agent(s) to prosecute this application and transact all business in the Patent and Trademark Office connected therewith. (*List name and registration number*)

Ralph E. Jocke
Reg. No. 31,029

(check the following item, if applicable)

☐ Attached as part of this declaration and power of attorney is the authorization of the above-named attorney(s) to accept and follow instructions from my representative(s).

SEND CORRESPONDENCE TO

Ralph E. Jocke
231 South Broadway
Medina, Ohio 44256

DIRECT TELEPHONE CALLS TO:
(Name and telephone number)

Ralph E. Jocke
(216) 722-5143

DECLARATION

I hereby declare that all statements made herein of my own knowledge are true and that all statements made on information and belief are believed to be true; and further that these statements were made with the knowledge that willful false statements and the like so made are punishable by fine or imprisonment, or both, under Section 1001 of Title 18 of the United States Code, and that such willful false statements may jeopardize the validity of the application or any patent issued thereon.

SIGNATURE(S)

NOTE: *Carefully indicate the family (or last) name as it should appear on the filing receipt and all other documents.*

Full name of sole or first inventor

Max *(GIVEN NAME)* A. *(MIDDLE INITIAL OR NAME)* Fedor *FAMILY (OR LAST NAME)*

Inventor's signature Max A. Fedor

Date November 21, 1994 **Country of Citizenship** U.S.A.

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Full name of second joint inventor, if any

Eric *(GIVEN NAME)* R. *(MIDDLE INITIAL OR NAME)* Colburn *FAMILY (OR LAST NAME)*

Inventor's signature E R.

Date November 21, 1994 **Country of Citizenship** U.S.A.

Residence Wexford, Pennsylvania

Post Office Address 2653 Black Oak Court
Wexford, Penmsylvania 15090

Full name of third joint inventor, if any

Robert	G.	Gillio
(GIVEN NAME)	*(MIDDLE INITIAL OR NAME)*	*FAMILY (OR LAST NAME)*

Inventor's signature Robert G. Gillio

Date November 21, 1994 **Country of Citizenship** U.S.A.

Residence Lancaster, Pennsylvania

Post Office Address 2001 Pine Drive

Lancaster, Pennsylvania 17601

CHECK PROPER BOX(ES) FOR ANY OF THE FOLLOWING ADDED PAGE(S) WHICH FORM A PART OF THIS DECLARATION

☒ Signature for fourth and subsequent joint inventors. *Number of pages added* 1.

* * *

☐ Signature by administrator(trix), executor(trix) or legal representative for deceased or incapacitated inventor. *Number of pages added* _____.

* * *

☐ Signature for inventor who refuses to sign or cannot be reached by person authorized under 37 CFR 1.47. *Number of pages added* _____.

* * *

☐ Added page for signature by one joint inventor on behalf of deceased inventor(s) where legal representative cannot be appointed in time (37 CFR 1.47).

* * *

☒ Added pages to combined declaration and power of attorney for divisional, continuation, or continuation-in-part (C-I-P) application.

☒ Number of pages added 1

* * *

☐ Authorization of attorney(s) to accept and follow instructions from representative.

* * *

(If no further pages form a part of this Declaration, then end this Declaration with this page and check the following item:)

☐ This declaration ends with this page.

Attorney's Docket No. D-1056

ADDED PAGE TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR SIGNATURE BY FOURTH AND SUBSEQUENT INVENTORS

Full name of fourth joint inventor, if any

Daniel (GIVEN NAME) W. (MIDDLE INITIAL OR NAME) Neu (FAMILY (OR LAST NAME))

Inventor's signature Daniel W. Neu

Date November 21, 1994 **Country of Citizenship** U.S.A.

Residence Pittsburgh, Pennsylvania 15237

Post Office Address 1000-8 Nineteen North Drive

Pittsburgh, Pennsylvania 15237

Full name of fifth joint inventor, if any

R. (GIVEN NAME) Michael (MIDDLE INITIAL OR NAME) McGrady (FAMILY (OR LAST NAME))

Inventor's signature R Michael McGrady

Date November 21, 1994 **Country of Citizenship** U.S.A.

Residence Baden, Pennsylvania

Post Office Address 218 Woodcroft Road

Baden, Pennsylvania 15005

Full name of sixth joint inventor, if any

(GIVEN NAME) (MIDDLE INITIAL OR NAME) (FAMILY (OR LAST NAME))

Inventor's signature _____

Date _____ **Country of Citizenship** _____

Residence _____

Post Office Address _____

Attorney's Docket No. D-1056

ADDED PAGE TO COMBINED DECLARATION AND POWER OF ATTORNEY FOR DIVISIONAL, CONTINUATION OR C-I-P APPLICATION

(complete this part only if this is a divisional, continuation or C-I-P application)

CLAIM FOR BENEFIT OF EARLIER U.S./PCT APPLICATION(S) UNDER 35 U.S.C. 120

I hereby claim the benefit under Title 35, United States Code, § 120 of any United States application(s) or PCT international application(s) designating the United States of America that is/are listed below and, insofar as the subject matter of each of the claims of this application is not disclosed in that/those prior application(s) in the manner provided by the first paragraph of Title 35, United States Code, § 112, I acknowledge the duty to disclose information that is material to the examination of this application, namely, information where there is substantial likelihood that a reasonable Examiner would consider it important in deciding whether to allow the application to issue as a patent, which occurred between the filing date of the prior application(s) and the national or PCT international filing date of this application.

PRIOR U.S. APPLICATIONS OR PCT INTERNATIONAL APPLICATIONS DESIGNATING THE U.S. FOR BENEFIT UNDER 35 USC 120:				
U.S. APPLICATIONS		Status (Check one)		
U.S. APPLICATIONS	U.S. FILING DATE	Patented	Pending	Abandoned
1. 08 / 009,055	01/25/93		X	
2. 08 / 186,285	01/25/94		X	
3. 0 /				
PCT APPLICATIONS DESIGNATING THE U.S.				
PCT APPLICATION NO.	PCT FILING DATE	U.S. SERIAL NOS. ASSIGNED (if any)		
4.				
5.				
6.				